The Infantry School

MAILING LIST

A compilation of instructional matter prepared at The Infantry School and issued from time to time

Containing the Latest Thought on Infantry

VOLUME XVI

Prepared by the Academic Department of the Infantry School under the supervision of the Assistant Commandant

U.S. DISTRIBUTED BY THE BOOK SHOP
THE INFANTRY SCHOOL, FORT BENNING, GEORGIA

10655—BENNING, GA., 4-20-38—5,000

PREFACE

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OCT 27 '42

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CHAPTER 1

The Affair of Chalgar

(A HISTORICAL TACTICAL TEST)

History, so it is said, is an excellent study for the soldier. From history comes our principles of war, our methods of fighting. But, unfortunately, we do not cover the whole field of human fighting; we only study an interesting but small part of it. For instance, what do we know of the campaigns of Charles XII of Sweden, who, as the poet said,

"He left the name at which the world grew pale,
To point a moral or adorn a tale."

Who on this side of the Atlantic can tell of the campaigns of Skobeleff the Russian, Belisarius of Byzantium, or Gonsalvo de Cordova of Spain—a rare infantryman. As for the great leaders of the East and Near East, they are beyond our ken. Yet some of their battles and campaigns are masterpieces if we are to judge from the results.

Actually we confine our study of warfare to the battles and campaigns waged by the great figures of history—our history—Alexander, Hannibal, Caesar, Marlborough, Frederick the Great, Napoleon, and Robert E. Lee; or the lesser lights Turenne, Conde, Saxe, Wallenstein, Gustavus Adolphus, Wellington, Grant, Sherman, Jackson, or the like. Whether they were successful wholly because of their military genius or because of some other factor, such as the ineptitude of their opponent or their own better national or military organization, or morale, no one ever stops to consider. They were successful, therefore great. The general who meets in battle one of these great figures

may be unfortunate, but at least his name gets into the histories. Better men than he—men who fought and *won* great battles—are often lost completely under the dust of history.

As a consequence of becoming enthralled by the drama of great personalities in war, we do not attempt to draw principles from the whole great field of war, from Kadesh to the Argonne, but try to draw them from the restricted field of war in which these masters appeared. This is unwise and may lead to error.

But this is not all the tale. In a restricted field such as has been outlined it is possible for the student to cover the ground carefully. He can know almost every battle and relate what should have been done according to the best authorities. Whether the authorities are correct is another matter. Whether the student has arrived at his opinion by real study and weighing of various factors or whether he has been subtly indoctrinated is still another matter, and a dubious one.

In any event, the result is the same—for every great battle, or what the pundits say is a great battle, we know what should or should not be done. Who are we to question the great military authorities or the great commanders of the past? Who has the temerity to criticize Hannibal for trying in battle a double envelopment against an immensely larger, better-equipped, and better-fighting force? Had we studied his decision to do this as an abstract military problem, without knowing how the battle turned out, we might call the whole scheme of maneuver foolhardy and a violation of the basic principles of war. But let someone whisper Cannae in our ear and we immediately know that it was an eminently proper decision. Did not Hannibal win? And, furthermore, does not the great von Schlieffen say the scheme was masterly and the model for all battle conceptions? Against such a situation one's critical faculties refuse to function.

The result of all this is that if we are to test our military understanding, our ability to apply sound military principles, we must step outside the narrow field where

authorities have decided the issue for us and delivered the judgement. After all, this is not so difficult. History is replete with battles not deemed important by the run of historians because they caused no great change in history. But no battle where thousands of men join in combat is unimportant to the military man if he has a scientific attitude, for the principles of war apply, or should apply, to all. As a matter of fact, the military historian cares little what great political or social effect flows from a battle; he is concerned only with how the fight was waged. Therefore, if we wish to make an honest test of our military knowledge and principles, we should study a large although perhaps unimportant battle.

In such a battle we can accompany one commander step by step and see the things as he sees them. The end of the affair is unknown, what to do is uncertain. We have to decide as the general decided amid the smoke and turmoil of combat. Thus, without the verdict of military scholars to sway us we can determine for ourselves what we would do in a battle situation and the result of the battle will prove if our judgement is sound.

There is no better battle to use for this purpose than the Affair at Chalgar. Both armies were large for the time and would be sizeable today. Their armament was short range muskets and muzzle loading cannon of no great range. Since a few erudite military students may recognize the campaign and have pre-formed opinions on the proper procedure, we will label the armies Red and Blue. The reader will accompany the Blue commander and try to match him decision for decision. No possibility exists of giving the reader all the factors that the Blue commander must have considered in reaching his various decisions. No book on any battle ever told all the details of the battle. No commander could ever tell all the reasons, conscious and subconscious, that led him to a certain decision. But, be that as it may, we can put a schematic picture before the reader that may furnish a basis which will enable him to arrive at a sound military decision. Then he can check his decision against the

actual one, and, as the story unfolds, see which is the more correct—judging, not on theory, but on what actually occurred. Don't damn the Blue commander if his decisions differ from yours; neither should you take any smug satisfaction if your decisions seem to agree with his. Perhaps you both are walking the *Via Dolorosa* to defeat.

THE CAMPAIGN OF CHALGAR

Korsokoff was the Blue commander. He had had great success in the past. He knew war, but certainly was unorthodox in his fighting. He had trained his present large army according to his own ideas, though, to be sure, these ideas were not in conformity with the best military opinion of his day. With a smaller army he had previously won victories against the Reds. His men appeared enthusiastic; his officers competent, but, frankly, the latter were without great professional training—even the generals. Whatever skill they may have acquired had been in the hard school of war. The trained professional officer was rare and often looked upon with something akin to suspicion.

This was the largest army that Korsokoff ever led. Any doubt that he could handle a large force seemed to be dispelled in the very opening battle of the campaign. By skillful, rapid maneuvering, rather than fighting, he outwitted and disastrously defeated the slow thinking General Marsal of the Reds. Thereafter, with little opposition Korsokoff sliced into Red territory. Town after town fell to him while the Red main army drew back. It looked as if the war would soon end. But these Reds had proven stubborn in the past and they were stubborn now. Painstakingly they gathered their strength, giving up territory and avoiding battle in order to concentrate all their forces. Meanwhile, Korsokoff, in order to hold his conquered territory, had been forced to garrison it. Gradually his large army was whittled away as the Red Army built itself up.

A more ominous sign was the straggling in Korsokoff's

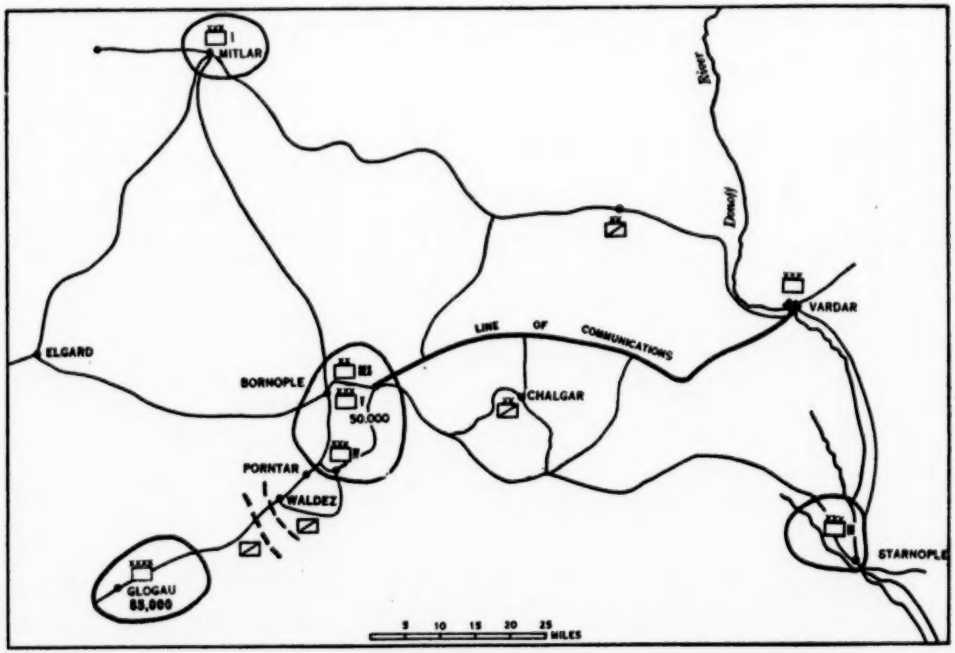

FIGURE 1.—Situation near end of November.

force. There was also some looting. True, the men had marched hard and fast, but looting and straggling have always been looked upon as the first signs of the weakening of discipline. Was it a sign of disintegration? Or was this army different from others? Perhaps the looting was due to the fact that Korsokoff, to obtain mobility, paid scant attention to supply from the base. The country was to furnish that. But he was now in poor country and when supplies were not forthcoming readily the soldiers were bound to loot and get out of hand. Even the great Napoleon learned that. However, stringent measures were taken to prevent depredation, even to the length of detailing troops to scour the rear areas to gather stragglers and shoot looters.

The autumn waned and Korsokoff still was following up his sullenly retreating enemy. The Reds were by no means defeated and by this time had built up a considerable army—in fact one larger than Korsokoff had immediately available. To reinforce this army the Reds had two others armies moving up. Winter was coming up even faster. The enemy had an unlimited expanse to retire into and Korsokoff was over 350 miles from his base.

Slowly the autumn dragged along. The days were bleak, and the nights were cold; a few flurries of snow fell. Korsokoff plodded after his retreating foe into country that was harsh and inhospitable. No doubt about it—this war would not be ended until this Red Army before him was defeated soundly. But how? When Red received the reinforcements of the other two armies, Korsokoff would be in a tight pinch even if he could mass all his scattered forces.

This, then, was the situation near the end of November. (See Figure 1.)

Around the fortress of Glogau the Reds were doggedly proceeding with their concentration. As a matter of fact, they had immediately available a much larger force than Korsokoff had with him near Bornople. To Korsokoff's rear, extending along his lengthly line of communication

and scattered in the occupied territory, was the bulk of the great army with which he had entered the war. He started out with an army of 200,000. Yet at this moment he had with him actually only 50,000 men. The Reds had about 85,000 even without the two reinforcing armies which were yet at a distance.

A glance at Figure 1 will show that at Mitlar (about 50 miles to the north) Korsokoff had one corps and near Starnople (nearly 80 miles east) another corps. Originally these corps together totaled 45,000 men, but now they cannot be expected to deliver on the battlefield more than one-third of that. From straggling, casualties, and other causes their effective force has been vastly reduced. Therefore, assuming that Korsokoff could concentrate these forces with the main army *prior* to a Red attack *he would still have a smaller force than the Reds,* even without their reinforcing armies. The best Korsokoff could hope for, even if he brought in these two corps and brought up units immediately to his rear, was a concentrated force of between 65,000 and 70,000 men. The farther forward he concentrated his two flank corps the smaller his army would be. If he should concentrate near the present vicinity of his main force—where the terrain lent itself to defense—he could not expect to gather together more than 65,000 men. The corps stationed in and about the city of Vardar is needed for holding that place and guarding the line of communication. Other divisions of the Blue Army are stationed along the communications to the Donoff River and farther to the rear.

For Red it seems that the sound thing would be to wait for the reinforcing armies. But, on the other hand, Red has lost prestige in the campaign and might endeavor to strike Korsokoff before the reinforcing armies came up. After all, Korsokoff's scattered situation does not appear comfortable and Red has numerical superiority. Furthermore, in a previous campaign Korsokoff scattered his forces, and when Red struck him he was only saved from defeat by a combination of fortuitous circumstances. The man does take chances. From the map it can be seen

that the superior Red main force is quite close to Korsokoff's main army. A rapid movement and a quick hard blow and Korsokoff would be defeated before his scattered forces could be collected. It looks like a set-up for a canny general.

It is true that if Korsokoff falls back he will gradually grow in strength as he picks up his garrisoning armies but only at the expense of losing prestige and lowering morale. On the other hand, if he remains in position and the Reds with their present strength move out toward him he may be able to call up his two wing corps, but even then he will be inferior in strength to the Reds. However, that is not all. The map indicates that the Blue right corps is at least a good three-day march away; while the left corps is at least four if not five normal marches away. Forced marches by these corps may reduce the time somewhat but only at the expense of bringing a tired and depleted force into action. As a matter of fact, a checking of space factors will show that the Reds are much closer to Korsokoff than is his own left corps. If Red moves out rapidly he can fall upon Korsokoff, certainly before the left corps joins and perhaps before the right one joins. That is one point to think about.

It would seem that Korsokoff's best chance would be to concentrate his outlaying corps and move at once against the Reds before they are reinforced. There are good reasons for this. It is late November; time is working against him and the situation—for the moment—seems stalemated. But how can he feed his corps in case he concentrates for an advance in this bleak country? Furthermore, dare he attack the Reds at such a distance from his base when they have the preponderance of force resting on a huge fortress—a fortress which not so far past had broken the teeth of a great soldier?

So much for the physical factors of time and space. What about the personal factor? What sort of reliance can be placed in these flank corps commanders? The commander of the left corps, Dolgoruki, is a little baldheaded man with no great reputation in the army. He is a

"back stairs" general according to gossip. He is somewhat of a martinet and it is related with a deprecating lift of the eyebrows that he is passionately fond of dancing. Certainly, he has not been thoroughly tried and tested in his new job. The commander of the right corps, Bosloff, is a first class soldier—when it suits his purpose—but above all else he is an intriguer of the first water. He can fight or plot with the best of them. Korsokoff's position of pre-eminence was attained without his help. There is more than a suspicion that he opposed Korsokoff's promotion; that he has been watched by Korsokoff's agents is notorious. But of late he has been dependable, perhaps due to special promotions and gifts. But does the leopard ever change his spots? It is only fair to the reader to say that in this special case the answer is *no*. But whether he changes now or in the future only time will tell.

That Korsokoff knew these subordinates far better than the men of his day must be accepted. But what he knew or judged or guessed, no one at the time knew. Nor can we be any too sure today.

From the welter of war these things stand out: Korsokoff is hundreds of miles from his base facing an enemy of larger size; winter is near. To support him in any engagement he has on his left an untried dancing master of a general, and on the right a Machiavellian character as adept at intrigue as he is at fighting. But the end is not yet. These two flank forces are farther from the Blue main body than is the enemy. (See Figure 1.) And even if they would join in time for battle Blue would still be greatly inferior in strength to Red. Korsokoff's troops can outmarch the enemy and they had at that time unlimited confidence in their chief, but there is such a thing as "working a willing horse to death." Check again the distances separating the main force from the flank corps.

It is no wonder that the faithful few around Korsokoff became first uneasy, then worried, and finally panicky. After much conference among themselves, the ranking

generals counselled a retreat—the situation was intolerable. So now a decision faces Korsokoff. What shall he do?

Study the maps and check the time and space factors carefully and then consult the list below. Check the decision you would make as General Korsokoff.

TEST I

1. Retreat. .....

2. Advance with the force at hand and attack the Reds around their fortress at Glogau. .....

3. Gather the two flank corps and then move on the enemy at the fortress of Glogau. .....

4. Remain in position, wait for the enemy to advance and then by forced marches concentrate the two flank corps near Bornople (the present position of the main body) and accept battle. .....

5. Wait for the enemy to advance and fall back while calling in the two flank corps and other troops and then accept battle. .....

6. Your own decision if differing from the above. .....

SITUATION, CONTINUED

General Korsokoff ignored the advice of his subordinate generals and decided to remain in his present position, expecting to concentrate his two flank corps by forced marches (See Decision 4, Test I, above), and fight in place.

That scheme may work but there are two big *ifs* connected with it. First, will Red oblige by moving toward Blue prior to the arrival of the Red reinforcing armies; and, second, how can Korsokoff possibly expect to get his flanking corps, particularly the east one, to his present position before he is struck?

As noted before, the need for garrisoning the country and scattering the army for subsistance has caused a considerable dispersion of the Blue force. Study the map again, review the situation, and indicate by a check mark below whether in your opinion Korsokoff's dispositions are sound for carrying out his decision. To assist the reader it may be said that theoretically within two days Korsokoff can concentrate near Bornople almost 59,000 men; in three days 73,000 men; in four days 106,000—if he can feed them or if nothing happens to him at Bornople in the meantime. That is, after orders are received the troops can get to the concentration area in that time, but it may take as much as 24 hours to get orders to outlying troops. Red already had about 85,000 men. To make the problem even simpler it may be stated that should Red advance Blue will do well to get 65,000 men together near Bornople before he is struck.

What do you think?

TEST II

The dispositions of the Blue army are sound.

Yes .....

No .....

SITUATION, CONTINUED

Since Korsokoff had decided to fight in his present vicinity he did not neglect a thorough reconnaissance of the ground.

He found that the terrain was very much broken. (See Figure 2.) In a rectangle of, say, ten miles from east to west, by seven miles from north to south, there were a number of hills and valleys which would hide large bodies of troops. The fortress city of Bornople occupied the northeast corner of this rectangle, and past it in a marshy lowland a mile wide flowed the Scarpa River. From the river, to the west, the ground rose and fell in a gradual ascent to the Heights of Parlac which occupied the center of the theater and thence it gradually descended to the town of Aurlac. Southeast of Parlac on the southern boundary of the area there were two large ponds. The plateau was skirted on the east by a brook called Geldar and on the west and south sides flowed the Leta River. The army line of communications, the road from Bornople to Vardar, ran along the Scarpa. There were few woods and the theater, though full of hills and dales, formed a good field of maneuver. At the time the ponds were frozen, and the ice on the marshy ground gave a secure footing. Because of the ice all streams and even the ponds could be passed by infantry, if not massed in dense columns or in too great numbers. It is not likely that guns or wheeled transportation could pass wide streams or ponds. The ice would not carry the weight.

The one outstanding terrain feature was the great hill mass of Parlac. It could not be avoided by an enemy advancing on Bornople. Furthermore, it would furnish a strong position and this was known to all, for it had been used for just that purpose not so many years past. One of the best of all soldiers had a hard task cracking it. Here was a position seemingly made to order for a defensive-offensive battle.

Providing Blue can gather a sizeable force in this vicinity, the Reds would face a difficult task. Let Blue

hold the hill mass, while Red wears himself out with a succession of attacks, and then a counterblow might bring about a Blue victory. But would it lead to the destruction of the Red Army? Possibly. But an active defense, so called, is not an easy maneuver in practice, though it looks simple in theory. Such things as the timing of the counteroffensive are ticklish matters. Furthermore, supposing Red comes up to the prepared position and seeing its strength sits down before it instead of attacking; meanwhile, waiting for his reinforcements to arrive before offering battle. True, Korsokoff would then have time to gather his scattered units and meet Red on somewhat equal terms or even with greater strength. But in such case Red could await his reinforcing armies or retire to his fortress at Glogau and go into winter quarters (it is now almost December) while Blue again would have to disperse his force to live. It would gain time for Red and time is playing against Blue.

In map maneuvers or map problems it is sufficient to figure out how to do the best thing to obtain a victory, but in war there are victories—and victories. What Korsokoff needs here is not to win a fight but a smashing victory—a complete overthrow of the enemy main army—if he is to win the war. That seems fairly obvious. After all, it is the winning of the war that counts—not the winning of a mere battle. To give credit to Korsokoff he saw this and proclaimed that he wanted a smashing victory. But then, so do all generals. However, how he could obtain it in this case was his problem. And now, also, it is the reader's. Study the map, review the situation, and check below what you would do in his situation if the enemy advances.

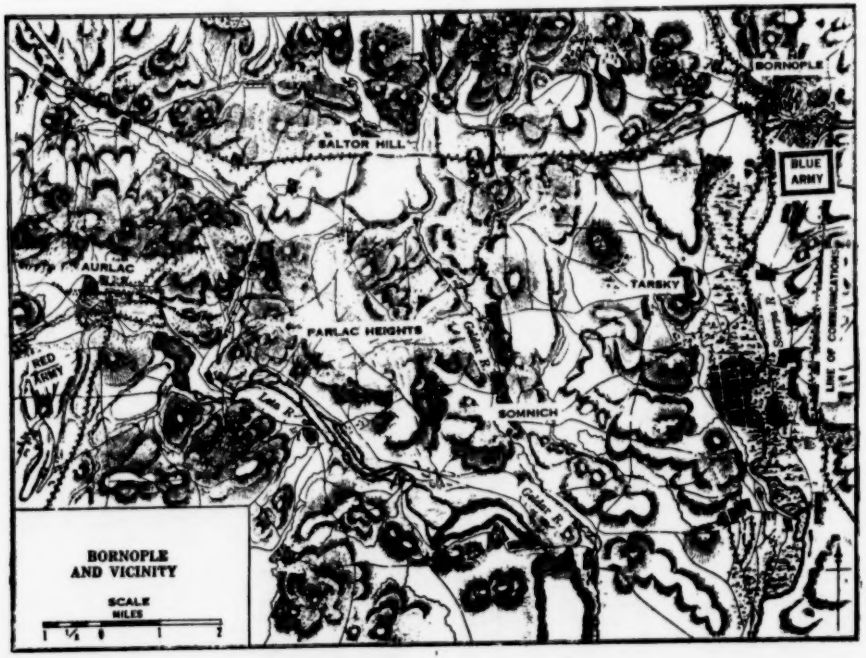

FIGURE 2.—Bornople and vicinity.

TEST III

1. Occupy the heights of Parlac and accept battle there. .....

2. Occupy a position behind the Scarpa in rear of the heights, leaving the heights unoccupied. .....

3. Occupy a position behind the Geldar in rear of the heights, leaving the heights unoccupied. .....

4. Occupy a position in front of the heights with the possibility of falling back on them if the enemy attack is too strong. .....

5. Occupy a position in front of the heights with the idea of luring the enemy into battle and then falling back to the heights and fighting the battle to a decision there. .....

6. Your own decision if differing essentially from the above. .....

SITUATION, CONTINUED

Korsokoff decided, in case the enemy advanced, to relinquish the heights of Parlac and draw up in line of battle behind the Geldar immediately in rear of these heights. (See Figure 3 for general line adopted.)

Perhaps the sight of the small Blue Army so near and so small was too much for the Reds; or, perhaps, it was the tales their spies brought to them, or their much dimmed prestige; in any event the Reds moved east from Glogau in five columns November 27th. It was not a long march they had to make but their advance was slow. The Blue cavalry at Waldez (See Figure 1) was assailed early that same morning but it was not until the next day (the 28th) that the Reds in force attacked and caused the Blue cavalry to retire. From the nature of the attack and Blue intelligence reports no doubt existed in Korsokoff's mind that the entire Red main army was in motion and quite close. Orders were sent in the afternoon to certain forces in the rear to concentrate near Bornople. This was the 28th. Not until 8:00 PM that night were orders sent to the I Corps at Mitlar; at 9:00 PM the orders were sent to the III Corps at Starnople—the farthest flung of all the outlying troops. Both corps were to concentrate at Bornople. The Blue Chief of staff, Barlov, expected battle soon and in all his orders urged immediate and rapid movement toward Bornople. It should be remembered that all these orders had to be carried by mounted messenger. It can then easily be seen that to start the corps moving would take time. As a matter of history, it took almost 24 hours for the message to reach the III Corps at Starnople. One hour later one division was on the road, minus its baggage train. Pretty work, surely, but still the corps was almost 80 miles from the battle ground. Figure that out in marching days. However, by the night of November 29th Korsokoff's troops were streaming toward their appointed place, although some of them were a long, long way from the battle concentration area.

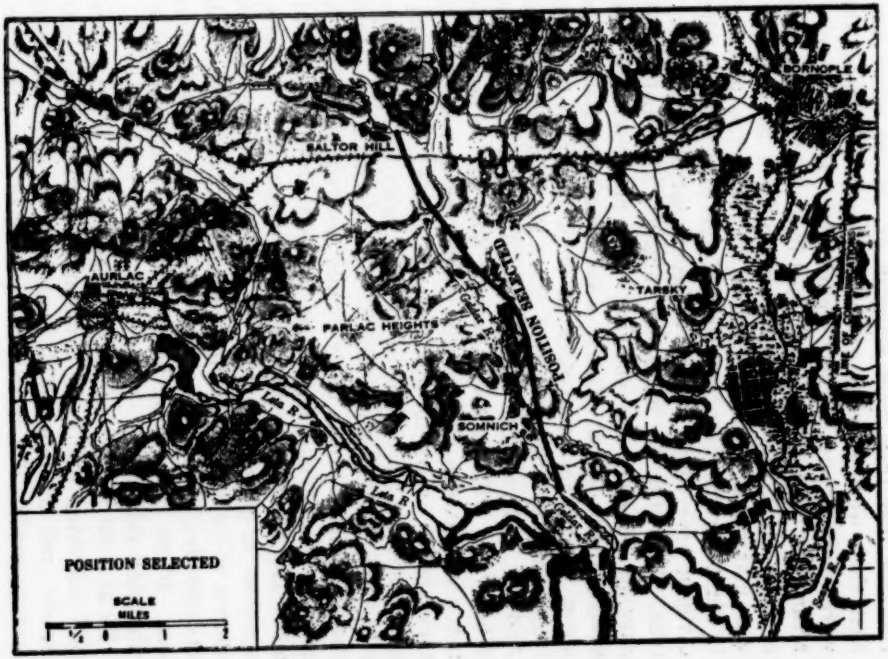

FIGURE 3.—Position selected by Korsokoff.

Korsokoff's chief of staff anticipated the battle either on the 29th or the 30th and had so informed his corps. But the movement of the Reds was very slow. One could conclude that they were sluggish or, on the other hand, that they were playing a waiting game. Perhaps, they were dallying until their reinforcing army came up. Meanwhile the Blue I Corps closed in swiftly and smoothly and the III Corps was storming up from Starnople. It was making a prodigious effort to reach the battlefield in time. In the first 24 hours of the march the leading division covered 53 miles. It seems incredible but it is true. Yet still 25 miles lay ahead. This baldheaded, dancing general was showing that he could do other things than dance. There was something indomitable about him. The commander in chief had called for the troops, and by the great God Mars he would have them! And yet, and yet—can humans stand such a terrific pace? What value will the corps be if it does arrive before the battle? What can sleep-drunk, exhausted men do even if they should arrive in time for the battle? Is this corps commander a mere theorist in war, who fails to understand the fragile human factor? His information indicates that the battle very likely would be fought before he could arrive. Would it not be prudent, then, to rest his men? He would have then a fairly fresh force to cover a retreat or press a pursuit. If he pushes on perhaps his column will disintegrate—men are falling out in wholesale lots already. Yet the commander in chief may be expecting him. If so, what can he get to him—soldiers or an exhausted rabble?

So at 9:00 PM November 30th at the end of 24 hours' solid marching and with a distance of 53 miles already covered and 25 more still remaining to do, a decision must be made. The reader can step down from the commander in chief's place and make the corps commander's decision. Check below your decision.

TEST IV

1. The command should be given a long rest of at least six hours. .....

2. The command should resume the march without delay. .....

3. The command should be given a rest of two or three hours. .....

4. The command should be given a rest of at least nine hours. .....

5. Your solution if differing essentially from the above. .....

SITUATION, CONTINUED

The command resumed the march without delay.

But now the pace began to tell. Men fell out in increasing numbers. They were trying and they were tough, but this terrific march was just too much for human flesh. The units began to dwindle in size. The suvivors must have walked in a dream during this second day, November 30th, but the third day, December 1st, dawned and they were still slugging up the road. But now the pace was slower. Will they arrive in time or has the battle already been fought? Let us take a look at the general situation.

The Reds, despite the opinion of the Blue chief of staff, did not push on rapidly and offer battle on November 29th. The 30th passed and still they delayed. Then came December 1st and still no battle. There was something queer here.

The 1st Corps from Mitlar had joined, and the night of December 1 at 7:00 PM the head of the III Corps reeled into its concentration position. It had marched 78 miles in exactly 46 hours. But the cost had been great. It had lost more than half its men and tomorrow—no doubt of it—the great battle would come off. Not until 11:00 PM was the corps established in its bivouac. Yet they had to rise early and march miles to the battle ground. The best they can expect this night is about six hours' rest. It is important to note this last.

Yet even with the III Corps, Korsokoff was well below the strength of the Reds. He had about 65,000 men to the enemy's 85,000. Still, he would accept battle on the position he picked out.

The reader now may pause and take stock of the situation. A battle is imminent. Blue will be attacked and where Red will make his main effort is problematical. It calls for study.

Let us take a survey of the map. The Blue left flank is the strategic one. A main effort here, if only moderately successful, would push Blue away from his line of com-

munication, make it difficult for Blue to retire and if completely successful might lead to the interposition of the whole Red Army between Blue and his base. On the other hand, the large ponds on this flank seriously restrict maneuver room. Moreover, Red, if initially successful here, would lay himself open to a strong Blue counterattack or even a counteroffensive and would be forced to fight with his back to the ponds and river—not a pleasant prospect—in fact, a decidedly dangerous one.

There is far more maneuver room on the right flank but a Red success here would enable Blue to retire along his line of communication. It might win a tactical victory but unless an overwhelming success was obtained Blue could slip away. True, a success here would cut the Blue Army off fram Bornople but that is little gained. Red, it can be imagined, would much rather have Blue cooped up in Bornople and cut off from his base, than slowly retiring along his communications and building up his army with increments, heretofore garrisoning the line of communications.

There remains an attack against the center. Standing starkly before the Blue center is the Parlac hill mass. Blue has given it up completely. A methodical occupation of this hill mass followed by the launching of a powerful attack against the Blue center might bring excellent results. If the Blue Army can be split, its whole right wing would be in a critical situation and very likely destroyed and the left wing would be fortunate to get away. The heights would give good observation for artillery. But any penetration is difficult, anywhere, any time. Generally, a flank attack is better. A penetration calls for great superiority in men and munitions. Has Red sufficient superiority? That is a question that can only be answered by battle.

Would it be better to attack the right flank, the left flank, or attempt a smash through the center? This is

the problem, we may be sure, that had been studied with great care by the Reds. And Korsokoff commanding the Blues was thinking with equal care about his enemy's probable actions.

Put yourself in Korsokoff's place. Carefully study the situation and check below what you would expect to meet if you were the Blue commander.

TEST V

1. The Reds will make their main effort on the left. .....

2. The Reds will make their main effort on the right. .....

3. The Reds will make their main effort in the center. .....

4. Your own expectation if differing essentially from any above.....

SITUATION, CONTINUED

Korsokoff believed that the enemy would throw his main blow at the Blue left flank and seek to strike against Blue communications. With this in mind he marshaled his forces for the great battle which would determine his fate and settle the war. (See Figure 4.)

So sure was Korsokoff of his opinion that he told those about him—even enlisted men—just what the Reds would do and just what he would do in return. To plan a battle with the expectation that the enemy would be considerate enough to fall into a certain plan of action and on that build your own scheme of maneuver is a risky procedure, as any textbook will tell you.

As stated before he had given up any idea of holding the heights of Parlac. His chosen battle line was to its rear along the Geldar. Keeping in mind the condition of the III Corps after its tremendous march, remembering that it had lost half of its effectives and a bare six hours was all the rest it could expect, the question naturally arises as to how to use these troops in the coming battle. Where would you put them? Check your decision below.

TEST VI

1. The III Corps should be put on the right away from the expected enemy main blow. .....
2. The III Corps should be put on the left. .....
3. The III Corps should be put in the center. .....
4. The III Corps should be put in reserve. .....

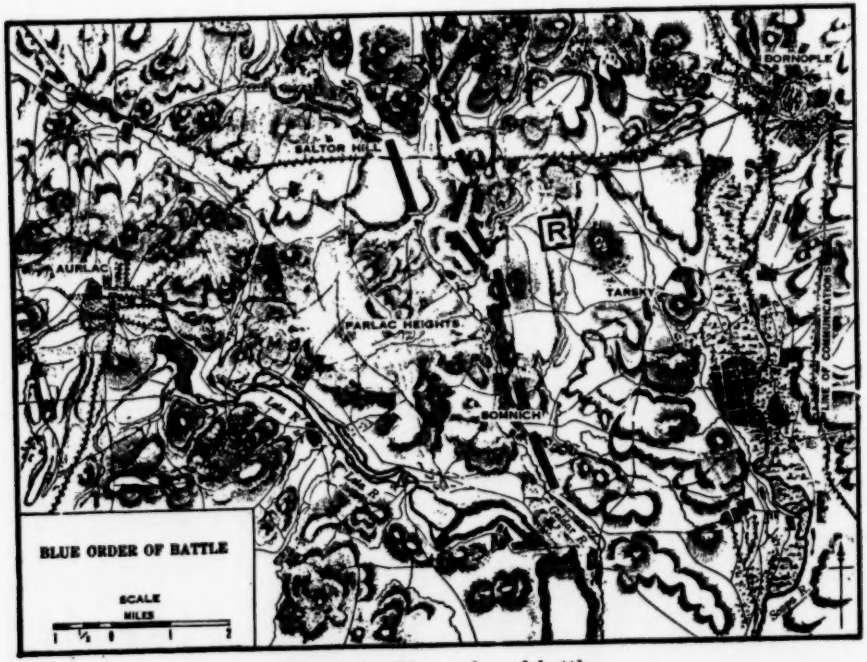

FIGURE 4.—Blue order of battle.
(Shown somewhat schematically for sake of clarity.)

SITUATION, CONTINUED

Korsokoff decided to put the III Corps on the left.

Between 4:00 and 5:00 AM December 2d the troops moved into their battle position along the Geldar. A thick fog covered the landscape but by 7:00 AM the sun burst out showing the heights of Parlac still unoccupied.

It showed also, and this was ominous, heavy masses of enemy infantry swinging around the shoulders of Parlac heights and moving against the left wing. Some thirty thousand enemy troops were concentrated against this weak flank. Against the right wing the pressure was not so heavy. (See Figure 5.) Korsokoff had judged correctly. The enemy was going to make the main effort against the Blue left. But had Korsokoff judged correctly in placing the weakened III Corps at the critical point of contact? Time alone will tell. And what is happening beyond the frowning heights of Parlac? Who knows?

Figure 5 shows—somewhat schematically for the sake of clarity—the Blue dispositions. A great battle impends. The enemy seems to have done just what the Blue commander expected. Yet what does he expect to do about it? Some may think that Korsokoff has committed several errors and has placed himself in a poor situation. Has he not given up the strong position on Parlac to accept a weaker one to the rear? Has he not raced his troops to the battlefield until one corps is almost on the edge of exhaustion; has he not placed this weakened corps at the point where he expects the main blow to fall? All very true. Perhaps the reader would not have done all of these things, or none of them. So why should he be saddled with the job of retrieving a series of errors—if they are errors? But in war officers have to take hold of a situation very far from their liking when a senior is relieved or becomes a casualty. Assume this is such a situation. Study the map (Figure 5) and give your decision on the following.

TEST VII

Since Korsokoff believed implicitly that the enemy would strike his left, he made an error in the initial placing of his reserve.

Yes .....

No .....

So much for the initial placing of the reserve but, now that the enemy plan is known, should the reserve be shifted? Perhaps the reserve could even at this late hour be moved to suit the reader's idea. At any rate, assume that it can. We shall let the reader fight this battle in his own way on the position selected by Korsokoff. Check below what you would do in this situation.

TEST VIII

1. The reserve should be moved closer to the north flank. .....

2. The reserve should be moved closer to the south flank. .....

FIGURE 5.—The start of the Red attack.

Korsokoff did not move his reserve.

However, one cannot make a decision regarding the placing of the reserve wholly on the situation outlined by the troops and the ground. It is necessary to project oneself into the future and think about the uses to which the reserve may be put. This, in short, means what tentative scheme of maneuver has the commander in mind. Sooner or later something will have to be done here. The sooner the commander makes up his mind the better for all concerned. So the reader as commander must now think of what he will do.

Initially, what scheme of maneuver would you adopt—tentatively at least—if you had the knowledge that the Red main effort would be directed against your left flank and actually saw it moving in force toward it? Korsokoff has bequeathed you the positon; your task now is to select the proper maneuver for securing victory or escaping unscathed. Of the ones below check your decision.

TEST IX

1. Retreat. .....
2. Throw the reserve to the left flank to bolster the situation there. .....
3. Use the reserve to strike the flank of the enemy main attack once it is committed. .....
4. Let the enemy commit himself to his main attack on the left and then strike him with everything on the opposite flank in order to envelop him. .....
5. Let the enemy commit himself on the left and then push up the heights of Parlac and strike him in the center rupturing his line. .....
6. Continue a passive defense. .....
7. Your own decision if differing essentially from any of these above.

(*NOTE*.—Decisions 4 and 5 are all predicated on the left flank holding and decision 5 calls for a straight attack over the hill mass of Parlac.)

SITUATION, CONTINUED

Korsokoff's plan was to strike the enemy center, rupture his line, and thereby cut off and take in flank the powerful enemy assaulting wing (Plan 5). He hoped that the enemy movement around his left would stretch their center thin and he would be able to rupture it. That is if he can take the plateau of Parlac before the enemy can affix themselves solidly to it.

Here, as in all battles, success or failure hinges on impalpable, intangible factors. Disregarding whether Blue has taken a sound position or made a proper concentration, passing over the fact that Blue is numerically inferior, and accepting the situation just as it is, analysis will disclose that Korsokoff's plan depends on three intangibles of battle. First, will the III Corps on the left wing hold against the overwhelming attack that is moving against it? What, if anything, has its tremendous march done to its morale and vitality? After all, if the Corps collapses under a powerful attack, no Blue offensive maneuver of any nature seems possible. Second, will it be possible to throw a powerful column over the hill of Parlac without meeting determined resistance on the heights that will hold the attack up at least long enough for the III Corps, which is vastly outnumbered, to be completely crushed? And, third, is the enemy center thin? What is going on beyond Parlac is beyond Korsokoff's sight and ken, though he can make a shrewd estimate for his intelligence service is good. But there is no intelligence service that can tell him how much additional punishment the III Corps can take without breaking. To determine their breaking point he has only his own opinion to guide him.

We can sum up by saying that in order for the Blue plan to succeed the III Corps must be able to hold; the resistance to the attacking column on the heights of Parlac must be weak; and finally the enemy center must be thin enough to enable the column of attack to make a "break-through" and roll up the enemy flanks and isolate their attacking wing. All these things have to happen

and none of them are known with certainty as the Reds advance to push their attack the morning of December 2d.

The battle opened at 7:00 AM. The Blue right and center remained in place. For the moment no Reds could be seen on the hill of Parlac. But on the left the tale was different. Here the massive Red columns slowly but surely were forcing the III Corps from its position behind the Geldar. The Blue troops were fighting hard and the corps commander was handling them admirably, but they were being driven back and the left wing by 9:00 AM was curving back in a dangerous arc. This is a battered corps and up until now it has taken the brunt of the battle. How much longer could it stand up under this steady pounding?

Here, again this intangible of war intrudes. To execute any maneuver takes time; therefore the remaining power of resistance of the III Corps will determine whether a maneuver is feasible or not. A maneuver that cannot be completed before the III Corps cracks should not be attempted. But who can tell when the III Corps reaches its limit of endurance? There is no slide rule that will enable a commander to compute that. He has only his own judgement and the factors that he must consider are so nebulous that seldom are they named. Perhaps they have no names.

Again a decision faces Korsokoff. Shall he continue with his original plan of driving across Parlac? Suppose his attacking columns get into a long drawn out fight to capture the heights and in the meanwhile the III Corps is crushed. The Blue Army will face certain defeat. True, there are no troops yet on Parlac but, never fear, some troops are making for it. Common sense indicates that. Would it not be the part of wisdom to use the reserve to attack the flank of the enemy assaulting columns east of Parlac instead of attacking up the slope? But suppose the enemy swarms up on Parlac, then the Blue counter-attacking force will be taken in the flank. This, however, may be obviated if Blue attacks all along the line and

captures the hill of Parlac. But still there is a flaw: what about committing the reserve so early in the day? That is a rrisky procedure. The whole matter is ticklish and yet if we knew how much the III Corps could take, perhaps the original decision could stand even if we have little faith in its efficacy. So again we come to a decision. Check below what you would do at 9:00 AM.

TEST X

1. Attack straight across Parlac as originally planned. .....

2. Using the reserve, attack the flank of the Red assaulting columns east of Parlac. .....

3. Using the reserve, attack the flank of the Red assaulting column east of Parlac, at the same time attacking and securing the hill of Parlac with the center. .....

4. Do nothing yet, except to move the reserve to back up the III Corps. .....

5. Do nothing yet since the time is not ripe. .....

6. Your own scheme if differing essentially from the above. .....

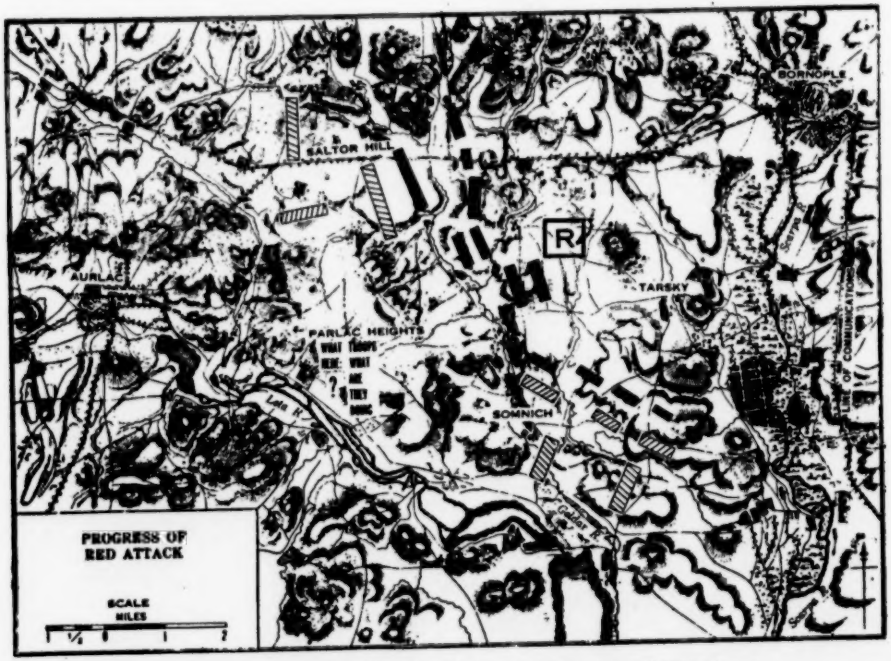

FIGURE 6.—Progress of Red attack and situation of III Corps.

SITUATION, CONTINUED

Korsokoff decided to adhere to his original plan and throw the weight of his main blow against the enemy center. Watch in hand, he had checked his time and at 9:00 AM he loosed his assaulting columns. The powerful center moved under General Solkoff straight on Parlac and ascended the steep slopes. As they reached the hill Red infantry appeared on the top. They were in route column and inferior in strength to Blue, but von Bohm, the Red commander, deployed his force and made a determined stand. A furious fight raged for the possession of Parlac. While this fight was going on the Blue right pressed forward steadily. Everything now depended on the Blue left. How were they making out during this fight?

Not so well. Here the fighting was terrific. One Blue general had four horses killed under him, while several others lost two apiece. The III Corps had lost Somnich and been driven back to the plateau between Somnich and Tarsky. (See Figure 6.) Here the troops held on grimly, but their casualties were enormous. In this area the Corps lost almost forty percent in killed and wounded. It was grim business and only a matter of time until the III Corps would be wiped out. Things had to move fast elsewhere. It was a race against time and the other Blue units had to move fast—and they were so moving.

By noon the Blue center after a hard fight was in complete possession of the Heights of Parlac, while the Blue right had punished the Red left so severely that it was in retreat. There was thus a huge gap of three miles in the center of the Red line which Solkoff held with his assaulting columns. The Red army had been cut in two; its mass of assault isolated. Smoothly and neatly Solkoff turned his force south and struck against the flank of this Red assaulting wing. He took their whole line in reverse. The battered and weary III Corps, even though depleted by ghastly losses, pushed forward to the attack, assisting Solkoff.

The great Red assaulting wing, entirely hemmed in, wavered and then broke. By 2:00 PM it was either destroyed or captured. The Red Army was an army no more.

Oddly enough Korsokoff did not have to use all his reserve. His scheme of maneuver worked out flawlessly. But it was based not so much on terrain—he gave up Parlac the great terrain feature—as on an astute calculation of other factors, particularly human ones. First, he had calculated exactly where the enemy main blow would come, then he calculated precisely how much time he had available in order to launch his attack before the enemy would take up a position on Parlac. He beat them to it by minutes only. That was shaving it pretty close. Finally he knew that the III Corps could make a phenomenal march and thereafter fight stoutly until his maneuver was completed. He knew—if the Army did not—that the dancing general was a first class soldier; which he was. Later he was to surprise the world. Furthermore, he knew the intriguing general was not yet ready to try any plotting. He fought stoutly that day. All these intangibles Korsokoff judged correctly and wove them into his battle scheme and with this scheme won a great victory.

Why did he give up the splendid position on Parlac, some may ask? Perhaps because he feared that by taking such a strong position he would scare the enemy off. They might wait for their reinforcing armies. Or perhaps—and this is more likely—he felt the scheme he chose was a better one since it would likely lead to an overwhelming victory. True, it involved many intangibles of battle, but to Korsokoff these things were every bit as tangible as a hill mass, and far more important in winning a smashing victory. He told exactly what was going to happen and what he was going to do. He even issued a proclamation about it. And it came out as he had foreseen and foretold. That, to drop into the vernacular, "is calling your shots."

Perhaps we are reading too much into this battle. Perhaps Korsokoff was a cocky, reckless, but lucky fellow. He might win one battle by such methods but surely would fail if he persisted in employing such a risky scheme of war. Perhaps this battle cannot be used as an example to prove anything. It may be just one of those military oddities that happen from time to time—such as Valmy—but which can be disregarded in the study of war. Certainly this viewpoint is worth some attention. However, this decision will be left to the reader. A glance at Figure 7 may furnish enough data to come to a correct decision. (See Page 311)

CHAPTER 2

Systematic Inspection and Correction of Infantry Motor Vehicles

(INFANTRY SCHOOL STUDY)

From the point of view of the man in the shop, preventive maintenance is a methodical system of *repair-before-failure*. This, to the infantryman, means lubrication, check-up or inspection, tune-up and tighten-up. These are all infantry functions. *Overhaul*—such as the disassembly of a major unit like an engine or a rear axle and its repair, or rebuilding and reassembly—normally, is not an infantry function. Parenthetically, it may be said that the frequent occurrence of this latter type of repair work is clear evidence of the break-down of the infantry preventive maintenance system. Of all the infantry maintenance functions listed above, "tune-up" is the least understood.

The phrase "tune-up" has been popular almost since the inception of the automobile industry. Yet, if the question were asked, "What is meant by tune-up?", it is doubtful if any two mechanics would give the same answer. It is not a mere matter of occasionally tinkering with breaker points or gauging spark plug gaps—as too many think. It is far more than that. The modern automobile vehicle, if it is to function smoothly and efficiently, periodically needs a definite series of co-related service operations. This is what is meant by "tune-up." It is not simple and for that reason the detailed analysis of the operation is reserved for

NOTE.—This article completes a series of two articles on infantry motors. The first appeared in Volume XV.

discussion later in the chapter. For the time it is sufficient to state that such a proper tune-up restores maximum engine performance and economy. However, like any other shop operation, when it is half done or carelessly done, its effectiveness is a matter of chance. But when it is carried out accurately, systematically, and completely, an engine tune-up is the most satisfactory of all maintenance operations.

Engine tune-up should be used in order to correct specific complaints and to periodically restore maximum engine performance and economy. A tune-up is the proper remedy for most specific complaints that are brought to the shop labeled hard starting, poor acceleration, engine missing, loss of power, low gasoline mileage, and the like. Proper inspection at this time will disclose several possible sources which might be the origin of the malfunctioning, but, ordinarily, to no single source can one definitely charge the difficulty. Hence, there is generally no one repair operation that can solve the problem. As a result, a complete engine tune-up is necessary. A tune-up, then, should cover all possible causes of a specific complaint, and in addition, include a check of every unit which contributes to good engine performance.

In fleet operation, periodic engine tune-up more than any other factor determines whether or not the operator will get the maximum performance and economy from his cars or trucks. One large truck corporation recommends a tune-up after each 5,000 miles of operation. Nearly all of the larger and more successful fleet operators have adopted similar tune-up periods.

However, tune-up is not a cure-all for every motor ill. Obviously, it is a waste of time to try and tune-up an engine, which has warped or burned valves, or one having scored cylinders or leaky piston rings. To do a satisfactory tune-up job, the car must be at least in fair mechanical condition. The tune-up job, therefore, should always be preceded by a preliminary operation—an inspection.

This inspection is the first step the practical shop executive takes in order to turn out a systematic and thorough tune-up job. After this comes a careful supervision of the

mechanical work. In addition the mechanic must be furnished with a definite procedure in some convenient form and be required to follow it religiously. Most of the modern shop manuals describe a definite tune-up procedure. However, the manuals are bulky and are inconvenient for the mechanic to use. Tune-up cards are more practical.

Below the tune-up procedure for the 1937 Dodge engine is furnished to indicate the scope of a tune-up operation. It is an excellent example of preventive maintenance that might, with some modifications, be applied to any automotive vehicle. A study of this chart will disclose that tune-up is not a simple or haphazard affair. Yet the individual operations are by no means complicated.

TUNE-UP OPERATION

1. *Battery and line voltage.*—Check voltage using voltmeter. Voltage unit should trip at 7.4 to 7.8 volts. Excess voltage will cause the distributor points to burn, hard starting, and headlamp bulbs to burn out. Clean and tighten battery connections. Tighten all primary and high tension wire connections.

2. *Tighten cylinder head and manifold studs.—Note.*—Iron cylinder heads should be tightened while engine is warm.

3. *Vacuum test.*—If engine is in proper condition the reading should be 18 to 21 inches of vacuum with engine idling. Steady low reading indicates late valve timing, flickering needle indicates burned, riding, or sticking valves; vibrating needle indicates weak valve springs or valves loose in their guides; extreme low reading indicates leaky intake manifold or carburetor gasket.

4. *Adjust valve clearance if vacuum test indicates necessity.*—See that engine is up to normal operation temperature. Remove valve cover plates. Adjust inlet tappets to .008 inch; exhaust .012 inch.

5. *Compression test.*—Before proceeding further with tune-up, a compression test should be made in order to determine the condition of valves, pistons, and piston rings.

6. *Spark plugs.*—Clean and space gaps to .025 inch using a round feeler gauge. A wider gap reduces speed and power; a closer setting may cause uneven idling of the engine.

7. *Distributor.*—Dress breaker points evenly, using a stone. Use a gauge and adjust to .020 inch. Carefully check distributor cap and rotor for cracks. Inspect primary insulator for current loss.

8. *Ignition timing.*—Use markings on fan drive pulley or indicator in cylinder head. Distributor breaker points should just start to open when piston is at position indicated in Shop Manual.

9. *Fuel system.*—Disconnect main fuel line at fuel pump and blow out with compressed air. Remove fuel pump, strainer bowl, and screen; clean and replace. Also inspect gasket to determine that it will seal properly to avoid leaks.

10. *Air cleaner.*—Remove filter element and clean it with kerosene. Empty oil from reservoir and wash the reservoir in kerosene. Fill reservoir to indicated level with engine oil. (Use S. A. E. No. 50 in temperatures above 32 degrees F, or S. A. E. No. 20 in temperatures below 32 degrees F.)

11. *Carburetor.*—Check float level from top of float chamber (gasket removed) to top of float. It should be 5/64 of an inch; use gauge. Set idle adjustment using vacuum gauge after engine has reached normal operating temperature. Adjust the throttle stop screw, to an idle speed of not less than six miles per hour. Accelerating pump link should be set to proper position. This setting varies with the weather as follows:

During warm weather use inner holes.

During normal summer driving use center hole.

During cold weather use outer hole.

12. *Final check and road test.*—Test with vacuum gauge. If operation has been correctly performed a reading of 18 to 21 inches of vacuum should be indicated. On road test, check for mechanical difficulties which affect performance: dragging brakes, under inflated tires, etc.

The above indicates the many operations and tests that

are summed up under the one word *tune-up*. It is not a casual word, but one that, no matter what the make of car, means a definite series of operations, tests, and adjustments.

Furthermore, it cannot be repeated too often or stressed too much that an *accurate* and *complete* engine tune-up probably is the most satisfactory of all preventive maintenance operations. And this—it might be noted in passing—is an infantry maintenance function. Unless the infantry does its job with competence there will be a general deterioration of infantry vehicles that no supply service can possibly prevent.

An important part of tune-up, and preventive maintenance in general, is the replacement, rather than the repair, of units found defective, such as generators, starting motors, and carburetors. A system of unit replacement, similar in many respects to that used by the Army, is universally used by large fleet operators. This method permits the rapid servicing and repairing of vehicles, and obviates the necessity of removing an entire vehicle from service while a small unit is being repaired. It, further, allows for specialization in the work of rebuilding or repairing the damaged units which have been replaced.

The infantryman is primarily concerned with the replacement of small units and not their repair or rebuilding. However, he often finds himself in maintenance "set-ups" where, due to the exigencies of the service, echelons of maintenance are merged or partially merged. Under these conditions, frequently, he will be called upon to make the decision whether rebuilding or repair of replacement units is practical. It is, therefore, important that the infantryman should appreciate the degree of specialization required and the necessity of highly trained, experienced and skilled personnel for such work. A survey of a civilian organization for doing such work will serve to indicate the complicated and costly organization that is required.

A division of one of the large automobile companies has stressed preventive maintenance to the public. In its branches in the principal cities, complete shops have been

established for this service. Tune-up and tighten-up are sold as the most satisfactory features of preventive maintenance. Major units or assemblies, such as rear axles, transmissions and engines, are not rebuilt or repaired; but all small units and assemblies, such as electrical units, carburetors, and shock absorbers are rebuilt and then exchanged for defective units found on the customer's car.

The manager of one branch of this organization considers a minimum of $10,000 worth of equipment essential to a shop attempting a similar service. He further believes that the personnel should be trained largely by the organization in cooperation with the manufacturers; that the men should be young and well educated; and among them there should be a considerable number of graduate engineers. He stresses the fact that the modern automotive vehicle is so finely built that repairmen of units or assemblies must today have a good educational background in order to understand the theory of automobile construction and operation.

To indicate the serious nature of the personnel problem which faces the Army, it is sufficient to quote what educational and special qualifications this branch manager considers essential in an efficient shop organization. A study of his specifications will clearly demonstrate that a motorized Army faces a difficult personnel situation. His specifications follow:

Service manager.—He should be a graduate engineer with about 15 years of experience, who can do any repair operation in the shop, and also repair most of the intricate testing equipment.

Floor manager.—He should be a graduate engineer with about six years of practical experience.

Carburetor department.—Here is needed one man with an excellent education and eight years of experience.

Electrical department.—This department requires one man, a generator specialist, with about 18 years of practical experience; and another man, a battery ignition system specialist, with 15 years of experience.

Speedometers, fuel pumps, chokes and windshield wipers.

—This department, or repair unit, needs a graduate engineer with four years of experience.

Lubrication.—Here is required one man, who is a first-class lubrication expert, with eight years of experience.

Wheel alignment and brakes.—This department requires one young and well educated man with five years of experience, who has made a very thorough study of the intricate details of front end alignment, and another man with 12 years of experience on brake work.

Tune-up.—Here is needed one man with 12 years of experience. A man, if possible, who was formerly head of an engine rebuilding department operated on an assembly line production basis.

Battery service.—For this, one well educated man with seven years of experience is needed.

Radio.—Three young college graduates are needed for this work.

General body and chassis work.—One very well educated man with seven years of experience is needed here.

But the personnel organization outlined above is only a start. There is more to do. It should be recognized that the design of automotive units and assemblies is constantly changing. Cars are becoming more intricate and their service, therefore, more complex and difficult. Consequently, the education of personnel merely to keep abreast of the times, must be continuous. Provision must be made for this education. In the organization mentioned above the problem was solved by the following measures: During the winter months all the men attend the service manager's school two nights each week and in the summer, one night. Each period is from two to three hours. Part of the instruction is given by the service manager and part by representatives of the different automotive parts and equipment manufacturers.

The organization just outlined, while it is an excellent one, is not considered an unusual one. Yet rarely would an infantry officer be able to assemble even a part of such an organization. From this, the immensity of the motor problem that the infantry must solve can be appreciated.

It is pleasanter to ride than to walk, but there is far more grief in maintaining a motor fleet than there is in caring for a soldier's feet.

Thus, the Army is confronted by a serious situation: What can be done to produce an organization that can compare in results with the one sketched above? We may as well admit that we can only approximate the civilian set-up. But by constant and careful inspections and various expedients it will perhaps be possible to overcome our difficulties to a large extent. In the first place, rebuilt replacement units can be purchased by the Quartermaster almost as cheaply as the parts needed to repair the defective unit. And if trained, experienced, and skilled personnel is not available to rebuild defective parts—very likely they will not be—it will prove cheaper, in most instances, to buy the parts. That is not a cure for the ill—the civilians have that and we cannot hope to duplicate it. We have only a palliative. But it will answer, after a fashion.

In the second place, there should be in the organization or immediately available for issue at the local Quartermaster, a stock of replacement units to meet the needs of a normal system of unit replacement. This stock must be based upon a study of the normal expected life of units and parts. In order to ascertain what the life expectancy of certain parts is, again we will have to turn to civil sources. The experience of a street railway company operating a large fleet of Dodge and Ford busses (the Army also has many of these vehicles) is adequate as a basis for such a study. From the records of this company the following table was compiled after long experience and systematic study. The information should prove invaluable to Army motor vehicle operators, not only as a basis for determining the necessary reserve of unit assemblies but also as a check on the functioning of the maintenance system. *Manifestly if unit assemblies are replaced well below the mileage found necessary in the right hand column, then something is seriously wrong with the maintenance system.* This point should prove interesting to commanding officers for

it gives them a rough yardstick to measure their maintenance systems.

Unit or Assembly	*Rebuild Period*
Generator	40,000 miles
Engine semi-rebuild	30,000 miles
Transmission	50,000 miles
Steering gear	100,000 miles
Front axle	100,000 miles
Differential	100,000 miles
Carburetor	30,000 miles
Distributor	60,000 miles
Water pump	100,000 miles
Fuel pump	50,000 miles
Clutch	30,000 miles
Fan assembly	100,000 miles
Starting motor	40,000 miles

The third and most important step is to adhere to a good maintenance system. (We cannot emphasize too much that this is an infantry function.) The following outlined system is condensed from AR 850-15, issued December 10, 1937, with certain pertinent material added.

MILITARY MAINTENANCE SYSTEM

The Army system of maintenance of motor vehicles is based on the principle of unit replacement rather than a major repair of a unit while installed in the vehicle. Motor vehicles are assemblies of units and sub-units, both of which are included in the term unit replacement as applied herein. Unit replacement will be practiced in all cases where supplies can be made available unless minor repair is all that is required. A minor repair is defined as one that can be made without dismantling the unit or removal of the unit from the vehicle. The scope of unit replacement will be distributed in the echelonment of maintenance—hereinafter prescribed—in accordance with personnel, equipment, and supplies available.

UNIT MAJOR REPAIR

This activity pertains to unserviceable units removed from the vehicle, and is a repair requiring dismantling and rebuilding of the units. In time of war, the responsibility for performance rests with a designated service and pertains to the Fourth Echelon of maintenance in the Communications Zone. In time of peace the responsibility will be in general decentralized to Corps Area Commanders.

RECLAMATION OF MOTOR VEHICLE UNITS AND PARTS

Efficient reclamation and use of serviceable motor vehicle units and parts are essential to economical maintenance of motor vehicles. No motor vehicle will be recommended for sale prior to inspection to determine whether or not the units and parts thereof can be economically reclaimed and are required for use.

MAINTENANCE

There are three elements essential to maintenance functions; namely, personnel, equipment and supplies. These essential elements will be furnished in accordance with the character of maintenance to be performed in the echelonment of maintenance prescribed below:

Roughly the maintenance functions may be divided into organization maintenance and service maintenance as defined and explained below.

a. Organizational maintenance is that normally performed by personnel of (or attached to) the organization to which the vehicle is assigned. It comprises two echelons.

(1) *First echelon.*—Preventive maintenance within the ability of and equipment available to the motor vehicle operator.

(2) *Second echelon.*—Preventive maintenance, minor repairs, and unit replacement within the limits of time available as determined by either the tactical situation or

the administrative requirements, utilizing hand tools, and light portable equipment provided in Tables of Basic Allowances, and the services of general mechanics.

b. Service maintenance is that normally performed by service (quartermaster or ordnance) personnel (see paragraph 25*b*(4) AR 850-15). This function is divided into two echelons—the third and fourth.

(1) *Third echelon.*—This may be a fixed or mobile shop, depending on the situation. It provides units and parts to the second echelon; unit replacement beyond the scope of the second echelon; repairs involving the use of medium mobile shop equipment and the services of general mechanics and a limited number of automotive trade specialists; and the evacuation to the fourth echelon shops of vehicles which require repairs beyond the scope of third echelon facilities. This echelon will be provided to serve a number of organizations in which the first two echelons are operating and will be charged with the technical supervision of the work of the lower echelons as directed by the commander of the unit to which this echelon is assigned. Maintenance units of the third echelon will be organized and equipped to provide immediate decentralized support to motorized organizations so situated as to require special support.

(2) *Fourth echelon.*—This will be a fixed shop charged with: supply of units and parts to the lower echelons; general overhaul and reclamation of units and vehicles when this involves major repairs, the use of heavy immobile or semimobile equipment and the service of mechanics and automotive trade specialists of the various automotive trade classifications. In an emergency it is charged with the manufacture of parts.

Equipment and supplies having been furnished by the responsible supply service, the first and second echelons of maintenance, as defined above, *is a responsibility of operating organizations (company, battalion, regiment or similar units) of using arms and services.*

Preventive maintenance as referred to in the functions of the first and second echelons of maintenance prescribed

above, includes inspection, lubrication, cleaning, adjusting, and servicing of motor vehicles and prevention of vehicle abuses. *Efficient enforcement of preventive maintenance is the responsibility of commanding officers of all units operating motor vehicles.* In carrying out this function, definite maintenance duties will be assigned the motor vehicle operator and he will be prohibited from performing any maintenance not specifically assigned.

Servicing of motor vehicles as referred to herein is defined as checking and replenishing gasoline, oil in crankcase, water in cooling system, and air in tires.

Examples of minor repairs, adjustments and unit replacements in second echelon maintenance by operating organizations are: soldering gas lines, welding small broken parts, electrical and fuel trouble shooting adjustments; adjustments of wheel bearings, brakes, clutches, steering system; and replacement of generators, carburetors, springs, magnetos or distributor heads, body parts and similar work.

The second echelon will be organized into appropriate company, battalion or regimental echelons to provide the most efficient and economical use of maintenance personnel, equipment and supplies available to this echelon.

It is the responsibility of the commander of the operating organization to utilize to the utmost the maintenance personnel and equipment assigned or attached to his organizations to maintain his vehicles in operating condition.

The third and fourth echelons of maintenance, as defined above, pertain to maintenance responsibility of supply arms and services. Facilities for the third and fourth echelons of maintenance will be provided by the Quartermaster Corps and the Ordnance Department. These facilities will be made available to, and will be utilized to the fullest extent practicable.

In peace time, funds having been made available by the responsible supply arm or service, third and fourth echelon maintenance may be performed by either Ordnance personnel or Quartermaster personnel, depending upon facilities available, economy and convenience.

As between the two services, in war time or in emergency, either the Ordnance Department or the Quartermaster Corps will perform such third and fourth echelon maintenance as may be requested and facilities permit, without previous agreement or transfer of funds.

Often a post commander without adequate Quartermaster or Ordnance facilities may have to install his own. This can be done by a request on higher authority. Regulations provide that the commanding general of a corps area or a chief of an arm or service may request approval of the War Department for the establishment of service maintenance at posts or stations under his jurisdiction, subject to the following conditions:

(a) If the repairs required cannot be furnished conveniently or economically by maintenance units of the Quartermaster Corps or Ordnance Department.

(b) If the procurement and use of the necessary equipment will be more economical than having the work done in commercial shops.

(c) If trained personnel, buildings and shop facilities are available or can be made available.

MOTOR VEHICLE FORMS, RECORDS, AND REPORTS

Forms, records, and reports pertaining to military motor vehicles are designed to serve necessary and useful purposes. Responsibility for accomplishment thereof rests upon commanding officers of all units operating and maintaining motor vehicles. The forms, records, and reports generally applicable to all arms and services operating and maintaining motor vehicles are:

	U. S. Standard Form
Driver's Report—Accident Motor Transportation	No. 26
Investigating Officer's Report—Accident Motor Transportation	No. 27

War Department

Data for U. S. Registration Number	Q.M.C. Form No. 220
Motor Vehicle Transfer Form	Q.M.C. Form No. 221
Motor Vehicle Operation and Maintenance Cost Record	Q.M.C. Form No. 222
U. S. Army Motor Vehicle Operator's Permit	Q.M.C. Form No. 228
Gasoline and Lubricant Issue Slip	Q.M.C. Form No. 231
Driver's Trip Ticket and Performance Record	Q.M.C. Form No. 237
Mechanical Inspection Report	Q.M.C. Form No. 246
Motor Vehicle Service Record Book	Q.M.C. Form No. 248
Report of Motor Vehicles on Hand	Q.M.C. Form No. 252
Report of Changes of Motor Vehicles	Q.M.C. Form No. 253
Dispatching Record (for motor pools)	Q.M.C. Form No. 254
Motor Vehicle Technical Inspection Report	Q.M.C. Form No. 260

MOTOR VEHICLE INSPECTIONS

As noted previously, inspections are an important part of any system of motor maintenance and particularly military maintenance. But what should be the scope of these inspections? This may be stated briefly as follows: Any system of motor vehicle inspection should fulfill five fundamental purposes. These are:

1. The system should detect negligence.
2. It should detect faulty practices.
3. It should be conducted so that correct clearances and adjustments will be maintained.
4. It should be conducted so that indications of failure of units and parts will be discovered.
5. And, finally, it should provide for corrective measures.

To accomplish the above a variety of inspections are necessary. These will be considered in detail.

ROUTINE INSPECTIONS

Routine inspections are essentially a check of cleanliness, lubrication, and efficiency of a vehicle. They begin with the driver of the vehicle and continue through all echelons of command charged with responsibility for motor transportation, including those echelons charged with administration of motor transportation, as well as those charged with its operation and maintenance. They may be further classified as follows:

Driver's inspection.

Inspections by section leaders and unit commanders.

Inspections by higher commanders (formal or informal).

The driver's inspection is continuous during the time he is on duty with his vehicle. He should be held strictly responsible for the correct fulfillment of all inspection requirements. He must always be on the lookout for indications of mechanical trouble. To assist the driver in making the required inspections, and to provide a suitable means of recording the results, each driver should be provided daily with an Operation and Inspection Report. (Driver's Trip Ticket and Performance Record, Q.M.C. Form No. 237).

In making out the Operation and Inspection Report, every line should be filled in. If there is nothing to report, "None" or "No" should be entered. By turning in his daily report a driver implies directly that he has made the required inspections both before starting and at the end of the day's run.

It is well worth emphasizing again that military authorities and operators of large civilian fleets of motor vehicles alike are in full agreement that efficient operation depends largely on two matters: first, permanent assignment of drivers to vehicles; and second, care in the selection and training of drivers. They are also in accord that the time devoted to conferences and demonstrations to emphasize the importance of careful driving, and in teaching drivers to report even minor troubles, is more than compensated

for by the savings effected in economical operation and maintenance.

INFORMAL INSPECTIONS

An officer or section leader, when making an informal inspection of a motor vehicle, should carefully note the following points:

Is the vehicle clean?

Do the points of lubrication in general show evidence of correct greasing?

Is there evidence of waste of lubricant, as shown by leakage on the ground or by excess lubricant at the points of lubrication?

Is there any indication of cargo loading above the capacity of the vehicle?

He should also question the driver as to commonly neglected points. If such inspections are made frequently, it soon becomes uncommon for the driver to neglect his proper inspection function—the neglect will too quickly come to light.

He should test units of vehicles to see that they are in adjustment. Different units should be tested on different vehicles, and the sequence of testing should not become routine.

He should check the lubrication record of the vehicle to see that it is kept up to date.

He should check the gasoline consumption records of the vehicle and compare it with other vehicles of the same type.

He should see that the equipment is in good condition, and that tools and accessories are complete and serviceable.

FORMAL INSPECTIONS

A formal inspection is one in which the vehicles are placed in a prescribed formation, with the personnel at definite posts and tools and equipment displayed in a uni-

form manner. The chief purpose of formal inspections is to determine the general condition and tactical efficiency of units as a whole. A formal inspection should be made at least once every month, by battalion or regimental commanders. If an inspection guide such as the one given in Appendix I is followed, this inspection can be made thoroughly and conducted in a minimum of time.

It is not expected that every vehicle will be inspected in every item on the inspection guide. Rather, one inspects a line of vehicles as one would a line of riflemen. With riflemen the inspector does not check every item the riflemen wears or carries. He closely inspects a hat here, a rifle there, the shoes of another soldier, a bayonet, a mess kit, a first aid packet, and so on. When he finishes he knows the shape the organization is in and, furthermore, the men know they have been inspected. So the motor vehicle inspector inspects his motors, and the guide furnishes him with the important items that might well bear looking into. Such inspections are not derived from theory but have evolved practically and have been thoroughly tested. They will produce excellent results.

On the other hand, an inspection of mere shine and polish is valueless and hurtful. A driver with a shining car who gets a commendation for his glittering vehicle often has a laugh on the commander, for under the car hood he may have a rattling, piston slapping engine produced by driver neglect. Cases are on record where continuous emphasis on "spit and polish" produced beautiful looking machines which failed miserably in annual maneuvers. It is not the shine on the hood that counts but the machinery under it. This all commanders should thoroughly understand.

Regardless of whether or not the commander's knowledge of motor vehicles is thorough, he should use his staff or other assistants in formal inspections. In units of any size the delegation of inspection duties is a necessity.

No definite method of procedure for formal inspection is prescribed. The form shown (Appendix I) is furnished as a guide in making this inspection. The following pro-

cedure, however, facilitates the work of an inspector:

All drivers raise the hoods of their vehicles to show the engine and open all tool boxes or other receptacles to show the interior. All tools and equipment are laid out in a uniform manner either in the vehicle or on a paulin or shelter half to the right of the vehicle.

As each vehicle is inspected, the inspecting officer checks it off a list of vehicles furnished him prior to the inspection. Vehicles not present are inspected later. Before inspecting each vehicle, the inspecting officer examines its last previous technical inspection report to note whether deficiencies reported at the last previous inspection have been corrected. The Motor Vehicle Service Record Book (QMC Form 248) is also inspected at this time.

In addition to inspecting for general appearance and cleanliness, inspecting officers should require drivers to start their engines, and should observe ease of starting and quietness of running. They should also inspect some particular unit in detail. For example, certain drivers could be required to move their vehicles a short distance and apply the brakes, while drivers on other vehicles should be required to snap on and off the lights of the vehicles. Other items that should be checked on various vehicles are:

Is the cooling system filled with water?

Is the battery filled?

Is the air cleaner serviced and oiled (if the oily type)?

Are tires inflated to the correct pressure?

Do the instruments on the instrument board function as they should?

Inspecting officers should also observe the cleanliness of parts, especially at points of lubrication. Inspection should also be made of the less accessible parts under the body and chassis. This inspection should include the detection of loose bolts, rivets and connections, rust and lack of paint on the exposed portions of the body, fenders, shields, etc., and accumulations of encrusted mud and dirt at any point. Tool kits and equipment should be checked for serviceability and completeness.

Men are proud of their vehicles. Hours are spent in

maintaining them. However, a cursory inspection fails to disclose this work; it is a disappointment to the men and lowers the morale and efficiency of the organization. At the same time partial, perfunctory, or cursory inspection lowers the prestige of the commander.

TECHNICAL INSPECTIONS

A technical inspection is a detailed inspection of all assemblies or units of a motor vehicle to determine whether or not those assemblies or units are:

Present.
Firmly secured in place.
Clean.
Worn or damaged.
Correctly lubricated.
Functioning properly.
Correctly adjusted.

The most experienced noncommissioned officers should be selected and trained for the important duty of technical inspection. They should have a thorough knowledge of the operation of every unit on the vehicle. They must be skilled "trouble-shooters." Second echelon technical inspection is a preventive maintenance function. It should be performed not less than once a month or after a 1,000 miles of operation, if a vehicle is run more than 1,000 miles in a month. Third echelon inspections are made once every three months or after 3,000 miles of operation, if a vehicle is run more than 3,000 miles in less than a three-months period. This inspection, also, is a follow-up and check on second echelon inspections and other maintenance functions and determines whether the vehicle should be continued in service or withdrawn from operation for overhaul.

In addition to an assistant (generally the driver of the vehicle) a technical inspector should be equipped with certain instruments such as a feeler gauge, a compression gauge, a portable combination vacuum and ignition testing instrument, and such hand tools as he may require.

When a vehicle is due for a technical inspection the inspector should, before beginning his inspection, drive the vehicle a short distance to determine its general functioning. He should note the sound of the engine and the functioning of the steering mechanism, clutch, gear-shift lever, brakes, etc. He should then stop the vehicle and, assisted by the driver, proceed systematically to test each unit and check off the items. Those correct are marked OK on the inspection sheet. Repairs or adjustments that require the action of the repair section are marked with an "X". Defects of a serious nature, which make the vehicle unsafe to operate, or which would cause serious damage to the vehicle if it were continued in operation, are marked with "XX".

After a vehicle has been repaired by the repair section it should be returned to the inspector for a final check and for his final road test before it is returned to service. The vehicle inspection form should contain a dated statement by the inspector that the vehicle has been inspected and is ready for service.

Appendix II is a guide for making a technical inspection and will suffice until a standard technical inspection guide is put out by the War Department. The use of such a guide insures that no items are overlooked. The items to be inspected are grouped in such a manner that the inspection proceeds logically throughout the entire vehicle.

From all the foregoing it can be seen that the task of keeping Army vehicles rolling is no easy one. There is no short cut; nothing can be slurred or overlooked. It takes precise, careful, and, oftentimes, tedious work and supervision. We cannot—must not—delude ourselves that the job can be done any other way. A motor age brings motor soldiers, but only by careful maintenance of motors will a commander be able "To move swiftly—strike vigorously and secure all the fruits of victory."

APPENDIX I

A MOTOR VEHICLE NON-TECHNICAL INSPECTION GUIDE FOR COMMANDERS AND THEIR STAFFS

Date.....

Organization..... Station.....

Type of Vehicle..... USA Reg. No..... Chassis No.....

Engine No..... Speedometer Reading.....

NOTE.—This inspection form is divided into four sections. One inspector should be assigned to each section for the purpose of making the inspections indicated therein.

In making an inspection of the vehicle, the inspector should ask himself the following questions:

1. Is the part there?
2. Is the part properly secured?
3. Is the part clean?
4. Is the part worn or damaged?
5. Does the part appear to be functioning?

A check mark (✓) in the column opposite the part inspected indicates O. K. To indicate a fault, enter the number corresponding to the question above in the column opposite the part inspected.

SECTION I (Outside of Vehicle)

(Front)	
1. Front bumper	
2. Radiator guard and grill	
3. Tow hooks	
4. Splash apron	
5. Headlights	

	Left Side	Right Side
6. Front fenders		
7. Front tires and wheels (check for abnormal wear)		
8. Hood and fasteners		
9. Running board and brackets		
10. Doors		
11. Windows or curtains		
12. Body		
13. Top		
14. Rear fenders		
15. Rear tires and wheels (check for abnormal wear)		

(Rear)	
16. Top	
17. Window or curtain	
18. Body	
19. Tail gate and chains	

20. Spare tire and wheel bracket	
21. Rear bumper	
22. Tail and stop light and bracket	
23. License plate	
24. Gas tank and cap	
25. Pintle	

SECTION II (Interior)

26. Upholstery	
27. Floor mats and boards	
28. Dome light	
29. Rear vision mirror	
30. Dash light	
31. Steering wheel and column	
32. Instrument panel (except functioning)	
33. Windshield, glass, hinges and brackets	
34. Fire extinguisher	
35. Operator's permit (QMC Form 228)	
36. Special driving or other instructions	
37. Accident report (Standard Form 26)	
38. Battery water level, battery carrier and cables	
39. Tools and equipment (see driver for list)	

SECTION III (Engine)

Before starting the engine	
40. Is the engine clean?	
41. Are the dust pans clean and secure?	
42. Is the oil pan clean? Any leaks?	
43. Is the air cleaner clean and properly serviced? Screen or filtering element should be clean and coated with oil. Container should be filled to the indicated level in the oil bath type	
44. Is the carburetor clean? Any leaks?	
45. Are leaks at fuel pump and gas lines?	
46. Are starting motor and generator secure?	
47. Is the oil level correct in oil pan?	
48. Is the radiator core free of mud, insects and dust? Is water level correct?	
49. Is there any sign of oil, gas or water leaks under the vehicle?	
50. Is there any signs of oil leaks from the transmission, universal joints and differential?	
Have the driver start the engine	
51. Does the engine run smoothly? Any knocks, unusual noises or vibrations?	
52. Do the instruments on the instrument panel appear to be functioning?	
53. Do the windshield wiper, horn and lights function?	

SECTION III (Engines)—Continued	
Have the driver move the vehicle over a route prescribed by you	
54. Does the vehicle move out without showing signs of unusual noises, etc.?	
55. Does the driver shift gears without clashing them?	
56. Do the brakes stop the vehicle within 20 feet at 20 m.p.h.? Does the stop light function?	
REMARKS:	

Signature of Inspectors:

Section I..... Section II..... Section III.....

SECTION IV (Records)	
1. Are the vehicle service records kept up to date?	
2. Is the daily dispatch report properly kept?	
3. Is the daily issue of gasoline and oil properly kept?	
4. Are vehicle technical inspection reports kept in accordance with A.R. 850-15?	
(Inspections)	
5. Are all vehicles periodically inspected in accordance with A.R. 850-15?	
6. Are the technical inspections made by a technically qualified man?	
7. Is there any difficulty being experienced in getting the vehicles for these inspections?	
8. Does the inspector check the work of the mechanical crew before a vehicle is returned to service?	
(Repair)	
9. Is the repair shop suitable for the work required?	
10. Are the mechanics properly supervised and instructed?	
11. Are the tools and equipment on hand suitable for doing the work required?	
12. Does the mechanical crew receive the required parts promptly?	
13. Are shop manuals available to the mechanics?	
(Lubrication)	
14. Are all the vehicles periodically lubricated according to a certain definite schedule?	
15. Are the lubricating facilities and the tools and equipment adequate?	
16. Are the proper lubricants being issued to the organization?	
17. Is a lubrication record being kept?	

(Miscellaneous)	
18. Is suitable and adequate fire fighting equipment on hand?	
19. In case of fire, can vehicles be moved quickly?	
20. Are tools, spare parts and equipment properly protected against deterioration?	
21. General Police:	
Office	
Garage	
Shop	
Wash rack	
Grease rack	
Battery shop	
Oil and grease storeroom	
Tool room	
Spare parts and equipment room	

OPERATION

1. Are vehicles being used for unauthorized purposes? Yes.....No.....
2. Have any cases of overloading or speeding been reported? .....Yes.....No.....

3*a*. Are any vehicles assigned permanently to individuals or organizations? .....Yes.....No.....

b. If so, are these vehicles reported regularly for inspection and servicing? .....Yes.....No.....

.....

Signature

NOTE: O.K. ( )
No (x)

APPENDIX II

A GUIDE FOR MAKING A TECHNICAL INSPECTION

Date.....

Organization ..... Note:

USA Registration No. ..... v Mark—O.K.

Type ..... X Mark—Requires repairs by repair section

Chassis No. .....

Engine No. ..... XX Mark—Emergency repair needed. Vehicle is dangerous to operate.

Speedometer Reading .....

Note: *a.* Road test for general performance. (Items 126-135, incl.)
b. Check vehicle's tool-kit equipment.
c. Are tires properly inflated? (Check before jacking-up.)
d. Jack-up and block vehicle securely. There must be no interferrence with steering action.

Questions which the inspector should ask himself while inspecting each numbered item. Groups 1 and 2 next to numbered items below indicate that the following questions apply.

GROUP 1. *a.* Is the part there?
b. Is it properly secured?
c. Is it clean?
d. Is it worn or damaged?

GROUP 2. *e.* Is it properly lubricated?
f. Is it functioning properly?
g. Is it adjusted properly?

	1	2	3
Front of Vehicle	Inspector's Check	Repair Section's Check	Inspector's Final Check
1. Front bumper .....Group 1.....	.....	.....	.....
2. Radiator grill and guard .....Group 1.....	.....	.....	.....
3. Towing hooks right and left .....Group 1.....	.....	.....	.....
4. Headlights .....Group 1.....	.....	.....	.....

Left Side of Vehicle			
5. Front fender, left ..... Group 1			
6. Front tire ..... Group 1			
a. Do tires need replacing?			
b. Are tires properly mounted in accordance with the balance dot to valve stem, and mounting ring to rim edge?			
c. Are rims loose on wheels?			
d. Have the tires bad bruises, cuts, or tears			
e. Is there excessive wear due to wheel being out of line? If so, wheel should be checked for camber, caster, and toe-in.			
f. Is the valve stem cap on?			
g. Are all rim lugs tight? (On demountable rims.)			
7. Front wheel hubcap and bearing, Groups 1 & 2			
Brake shoe and drum			
a. Are the bearings in good condition and properly adjusted?			
b. Are the hub caps securely fastened?			
c. Are the wheels bent, warped, or spokes bent, or broken?			
d. Are the spokes tight in the hub, rim?			
e. Are the hub bolts tight?			
8. Spare tire, wheel, lock and key, Group 1 and see No. 6			
9. Hood and latches ..... Groups 1 & 2			
10. Steering gear case .... Group 1 and lubrication			
11. Windshield ..... Group 1			
12. Running board and brackets ..... Group 1			
13. Doors, front and driver's name plate, Groups 1 & 2			
Check door and top latch, handle, hinges and straps			
14. Doors, rear ..... See item 13			
15. Windows or curtains ..... Group 1			
16. Body ..... Group 1			
17. Top ..... Group 1 and tears and leaks			
18. Rear left fender ..... Group 1			
19. Rear left tire, wheel and hubcap See item 6 & 7			
Rear of Vehicle			
20. Body ..... Group 1			
21. Window ..... Group 1			
22. Rear bumper (if any) ..... Group 1			
23. Tail and stop light ..... Group 1			
24. Liscense plate ..... Group 1			
25. Gas tank cap ..... Group 1			

Right Side of Vehicle			
26. Right rear fender ..... Group 1			
27. Right rear tire and wheel ..... See item 6 & 7			
28. Right running board and brackets ..... Group 1			
29. Body ..... Group 1			
30. Door, rear ..... See item 13			
31. Door, front ..... See item 13			
32. Windows or curtains ..... Group 1			
33. Right front fender and brackets ..... Group 1			
34. Right front tire, wheel, hubcap and bearing ..... See item 6 & 7			
35. Hood and latches ..... Groups 1 2			
Interior of Vehicle			
36. Upholstery ..... Group 1			
37. Floor mats, front and rear ..... Group 1			
38. Floor boards, front and rear ..... Group 1			
39. Steering wheel and column ..... Group 1			
a. Is it properly adjusted for end play?			
b. Is the steering gear column bolted securely to dash of vehicle?			
c. Does it bind at this point?			
40. Controls (brake pedal, clutch pedal, hand brake) and floor board clearance. Rachet and pawl on hand brake. ..... Group 1			
41. Gear shift lever ..... Group 1			
a. Is difficulty experienced in shifting gears?			
b. Are there oil leaks in the shifting tower, evidenced by oil on the gear shift lever?			
c. Is the breather clean and open?			
d. Is the reverse lock functioning?			
42. Instrument panel ..... Group 1			
43. Panel light ..... Groups 1 & 2			
44. Rear vision mirror ..... Group 1			
45. Horn ..... Groups 1 & 2			
46. Dome light ..... Groups 1 & 2			
47. Fire extinguisher ..... Group 1			
Under Vehicle			
48. Tire wear, front wheels, due to faluty steering alignment ..... See item 6			
49. Front axle alignment. Has axle shifted on spring seat?			
50. Front axle center ..... Group 1			
51. Front spring right, clips and U bolts ..... Group 1			
52. Front spring right, pivot and shackle ..... Groups 1 & 2			
Do springs show excessive sag?			

Under Vehicle, Continued			
53. Shock absorber, right ..... Groups 1 & 2			
54. Front spring left, clips and U bolts Group 1			
55. Front spring left, pivot and shackle See item 52			
56. Shock absorber, left ..... Groups 1 & 2			
57. Tie rod and tie rod ends and pivots Groups 1 & 2			
58. Steering knuckle arms, right and left Groups 1 & 2			
59. Steering knuckle gear rod arm, Groups 1 & 2			
60. Steering gear connecting rod .... Groups 1 & 2			
61. Steering gear arm ..... Groups 1 & 2			
62. Steering gear shaft ..... Groups 1 & 2. Check for end play and bushing wear.			
63. Steering knuckle pivots, bearings and bushings ..... Groups 1 & 2			
64. Oil pan ..... Group 1 & leaks			
65. Exhaust pipe ..... Group 1			
66. Clutch case ..... Group 1			
67. Transmission case ..... Groups 1 & 2 & leaks			
68. Universal joints and propeller shaft Groups 1 & 2 & leaks			
69. Battery carrier ..... Group 1			
70. Muffler and tail pipe ..... Group 1			
71. Rear axle housing ..... Groups 1 & 2 & leaks			
72. Spring right rear, clips and U bolts, Group 1			
73. Spring right rear, pivot and shackle Groups 1 & 2 and do springs show excessive sag?			
74. Shock absorber right ..... Groups 1 & 2			
75. Spring left rear, clips and U bolts, Group 1			
76. Spring left rear, pivot and shackle See item 73			
77. Shock absorber left ..... Groups 1 & 2			
78. Frame, right and left side members, Group 1			
79. Frame, cross members ..... Group 1			
80. Subframe ..... Group 1			
81. Body bolts ..... Group 1			
82. Brake control rods, hand, clevis pins and cotter keys ..... Groups 1 & 2			
83. Brake control rods, foot, clevis pins and cotter keys ..... Groups 1 & 2			
84. Brake equalizer and crossshaft, Groups 1 & 2			
85. Gas tank ..... Group 1 & leaks			
Engine, Left Side			
86. Check oil level ..... Check oil level			
Note: *Start and warm up engine.*			
87. Radiator and cap ..... Group 1			
88. Leakage in cooling system .... Check for leaks			
89. Fan belt ..... Group 1 and tightness			
90. Automatic heat control ..... Group 1			
91. Inlet manifold gasket and bolts Group 1 & leaks			

Engine, Left Side, Continued			
92. Exhaust manifold gasket and bolts Group 1 & leaks			
93. Exhaust pipe ..... Group 1			
94. Carburetor gasket and bolts, Group 1 & leaks			
95. Oil filter ..... Groups 1 & 2			
96. Fuel lines and connections ..... Group 1 & leaks			
97. Oil lines and connections ..... Group 1 & leaks			
98. Oil filler cap ..... Group 1			
99. Crankcase ventilator pipe ..... Group 1			
100. Dust pan left ..... Group 1			
101. Air cleaner ..... Groups 1 & 2			
102. Windshield wiper ..... Groups 1 & 2			
103. Ammeter ..... Groups 1 & 2			
104. Oil pressure gauge ..... Groups 1 & 2			
105. Water temperature gauge ..... Groups 1 & 2			
106. Fuel gauge ..... Groups 1 & 2			
Engine, Right Side			
107. Hose connections upper and lower Group 1 & leaks			
108. Cylinder head gaskets and bolts Group 1 & leaks			
109. Valve clearances Groups 1 & 2 and valve springs			
Note: *Stop engine.*			
110. *a.* Compression Cyl's No. 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6			
b. With oil No. 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6			
If compression readings are normal do not test with oil			
111. Spark plugs ..... Groups 1 & 2			
112. Spark plug cables ..... Group 1			
113. Coil and Coil high tension cable ,Groups 1 & 2			
114. Condenser ..... Groups 1 & 2			
115. Breaker points ..... Groups 1 & 2			
116. Starter cables and connections ..... Group 1			
117. Battery and connections ..... Groups 1 & 2			
118. All electrical connections ..... Group 1			
119. Dust pan right ..... Group 1			
Note: *Start engine.*			
120. Fuel pump ..... Groups 1 & 2 and leaks			
121. Ignition timing ..... Group 2			
122. Carburetor adjustment ..... Group 2			
123. Head-lamps (focus and dimmers) ..... Group 2			
124. Tail lamp ..... Group 2			
125. Stop light ..... Group 2			

NOTE: *Final road test after repairs and adjustments*	1	2	3
126. Steering action. Does it steer easily straight ahead and in full traverse in either direction without wandering or weaving or steering to one side?			
127. Clutch action. Does clutch operate freely without grabbing, dragging or slipping?			
128. Transmission action. Do gears shift easily and freely in all speeds? After meshing does movement of gear shift lever show excessive wear? Is there excessive transmission noise indicating wear?			
129. Are brakes properly equalized and do they operate without grabbing or dragging?			
130. Engine performance. Does engine idle smoothly? Does it accelerate without faltering? Does it indicate loss of power or does it knock under load?			
131. Body squeaks and rattles. Listen for body squeaks and rattles.			
132. Oil pressure. According to manufacturer's specifications.			
133. Charging rate. For proper charging rate			
134. Water circulation. Stop vehicle, feel for hot spots on engine and cold spots on radiator.			
135. Speedometer action (reading) check on measured course			

Remarks: General condition of vehicle—1. lubrication	
2. cleanliness	
(Rate above items—E, excellent; G, good; P, poor) 3. serviceability	
(Rate: S, serviceable; X, minor repairs; Y, major repairs; Z, salvage.	

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Inspected by..... Work order made out.....

Repairs made by.....

Vehicle ready for operation

.....

(Inspector)

CHAPTER 3

Chemical Agents in War

(INFANTRY SCHOOL STUDY)

(So long as there exists a possibility of gas being used in warfare, it is imperative that all infantry officers understand the scope of chemical warfare. This means they should know the gases that might be used against them, and when, where, how, and why they would be used. Such information is necessary as a purely protective matter alone. —EDITOR.)

Modern warfare, in all its forms, depends essentially upon chemicals and chemical processes. The man behind the "man behind the gun" is the chemist.

If one looks in upon the activities of almost any of the world's great arsenals today, one finds a relentless chemical contest in progress there. On the one side there is a group of metalurgists, versed in the chemistry of metals and alloys, striving to meet the demands of mechanization for light armor plate which will turn aside bullets and other projectiles. Arrayed against them is another group, seeking increased hardness and toughness in projectile metals, increased muzzle velocities, more and more penetration, power, and range. Allied with this latter group are the explosive experts, for it is their particular brand of chemistry which alone can supply the ever-increasing need for propellant energy.

From the viewpoint of metalurgy alone, an art which leans heavily upon chemical science, warfare has a decidedly chemical aspect. Indeed, this has been the case, more or

less, ever since the curtain fell on the Stone Age, and man turned to metals for his weapons.

It was the introduction of gunpowder, however, that gave a definite chemical tinge to the activities on the battlefield. Incidentally, it was some two hundred years after gunpowder was discovered before it won its way in the late Middle Ages to an accepted place in the array of military weapons. And even then its use was still decried by some as "an insult to good archery." The early fabricators of gunpowder were chemists of sorts. But gunpowder is not a true chemical compound. It is merely a mechanical mixture of different substances. The only chemistry involved in its use is in its explosion, a chemical process in which a substance disintegrates very rapidly, with violent release of physical energy. It remained for the discovery of smokeless powder—a true chemical compound—for the position in the arsenal of the explosives chemist to be firmly established.

As we have said, the chemical aspect of firearms warfare is not confined to the background of the arsenal. It crops out again right up on the line of battle. Every time a soldier inserts a cartridge in his rifle and "squeezes" the trigger, he causes a chemical reaction to take place. He may not know this. There is no good reason why he should. Of no concern is it to him that our military explosives are compounds of nitrogen, a substance which usually combines with other chemicals with the greatest reluctance; and which has a way of leaving them suddenly upon the slightest provocation—in a huff, a bang, and with a tremendous push or shattering effect, depending upon the particular type of chemicals it has been associated with.

There is nothing simple in this chemistry of firearms, either as to the processes or the technical terms involved. But soldiers are accustomed—and they do well—to leave this scientific side of firearms to the arsenal experts, and confine themselves to the practical employment of what the arsenal turns out.

When we come to consideration of chemical warfare, however, soldiers frequently are called upon to go behind

the scenes, and probe into the chemical mysteries which underlie this particular kind of combat. This, no doubt, is desirable, even necessary, in the case of certain specialists. But, for the great mass of officers and men, there certainly is no good reason why chemical warfare need be unduly complicated and difficult to comprehend. A soldier does not have to understand chemistry to be an expert rifleman, nor need an officer be a chemist in order to direct the use of fire power. The same is true of the practical application of chemicals in battle.

It is unquestionably a fact that much of the literature of chemical warfare is technical or at least interspersed with technical terminology that has little or no significance to the layman. In time, perhaps, such terminology will disappear entirely from training matter. Meanwhile, no one need be perturbed by it. For each war-chemical there is a simple symbol which serves all needs of the soldier as a distinguishing name. However, lest anyone feel that complex terminology is in any way peculiar to chemical warfare, let him glance at a list of the chemical names of the high explosives. We need mention only one—*Pentaeruthuritetetranitrate*. Even the chemist, at times, finds it convenient to call this substance *Petyn*, for short.

MEANING OF CHEMICAL WARFARE

Since, as we have seen, all warfare has a chemical basis, what, then, do we mean by this specific term, *Chemical Warfare?*

Twenty-three years ago, on last April 22d, the Germans in the World War released a great cloud of chlorine gas in their front lines in Flanders. The wind carried the suffocating, lung-destructive cloud over into the Allied position where troops were without any means of chemical protection. The gas, being heavier than air, seeped into trenches and dugouts and spread over a wide and deep area before the forces of Nature finally dissipated it. Some 20,000 casualties including about 5,000 deaths resulted. Modern chemical warfare thus began; a new group of chemists,

largely recruited from dye plants and pharmaceutical establishments, came into the arsenals; a new problem confronted the military surgeon, and toxicology entered the picture in the scientific background of the art of war. Once started, such chemical means were employed with the utmost vigor by all belligerents. Chlorine gave way to the more deadly gas, phosgene, and after phosgene came mustard gas, perhaps the worst of all because it attacks any part of the body it touches, and, therefore, the gas mask is only partial protection against it. The properties of mustard gas and other chemical agents are discussed in some detail later. Cloud gas attacks, dependent on favorable winds, came to be supplanted largely by the use of the chemical mortar and artillery shell, which released gas directly on the target. Screening smokes, and substances useful for incendiary purposes, also came into extensive use. In the search for new death-dealing compounds, chemists were engaged by the thousands, and special corps of troops were organized to employ this new weapon—gas—which actually "shoots around the corner."

But how are we to define this sort of warfare? What essential difference is there between it and other more familiar methods?

It will help us, perhaps, to consider the outstanding differences in the action of a standard high explosive shell and one loaded with a toxic gas-forming chemical and containing only sufficient explosive to burst the shell and release the gas.

After the high explosive shell explodes, and its last fragment has come to rest, its action is finished. Moreover, except for the effects of concussion upon those close to the point of burst, anyone not in the path of a flying shell fragment is unaffected. Such is not the case in the explosion of a gas shell. Here, a cloud of gas is formed, affecting everyone within its radius. The size and potency of the cloud depends, of course, on the number of shells employed. This cloud does not remain at the point of its generation. It expands and also travels with the wind,

and thus may cause casualties at distances where there would be no danger from a high explosive shell.

We still, however, lack sufficient information upon which to word a definition of chemical warfare. Let us consider the matter further.

In the use of ordinary firearms, the chemical process ends with the explosion that drives the bullet from the gun; or in the case of a shell, the explosion which shatters the shell to bits at the target. This chemical change, in which the explosive is destroyed, imparts energy to the projectile and thereafter the action of the bullet or shell fragment is purely physical or mechanical.

In chemical warfare, however, casualty effect is produced by direct action of the chemical on the tissues of the body. There is no physical violence in the contact of the weapon with the target. Indeed, this contact is exceedingly gentle, since the weapon here is but a gas or vapor, or a cloud made up of minute liquid or solid particles.

Another outstanding difference of chemical warfare is that frequently the injury or other physiological disturbance caused by the chemical does not manifest itself immediately. In fact, in the case of mustard gas (HS), it may be some hours after exposure before symptoms appear and the victim realizes he is injured. It is clear, then, that although chemicals are involved in both chemical and physical warfare, only in chemical warfare does chemical action directly produce the physiological effect. To define chemical warfare, however, we must include, also, screening smokes and incendiary materials. These substances are very different in their nature and effects from each other and from gas, but all have this in common; namely, they act through their chemical properties directly upon the target, without any physical intermediary as is the case in the use of explosives. Hence, we may define chemical warfare as a method of war in which substances are used for their direct chemical action to produce a powerful physiological effect, a screening smoke, or an incendiary action.

EARLY MILITARY USES OF CHEMICALS

The date of the first German gas attack, April 22, 1915, is taken as the beginning of modern chemical warfare, because it is from that date that modern chemical science has been applied to the direct use of chemicals as weapons. However, the adage that there is nothing new under the sun finds no real exception in chemical warfare. The ancient Greek warriors made use of crude chemical devices for incendiary purposes at least, and, no doubt, also for the noxious fumes generated in these chemical processes. Thucydides, in his account of the Peloponesian wars, tells of the use of burning pitch and sulphur by the Spartans in their siege of the Athenian city of Plataea in 428 BC. A few years later in the same war the Spartans constructed a device consisting of caldron, pipe and bellows to pump fire and fumes into the city of Delium. Such chemical methods came to be employed more or less extensively in sieges in the Middle Ages. Who has not heard of the *Greek Fire* of medieval Byzantium? But as warfare became more open in character, these primitive means fell into disuse, being no longer applicable.

Certain bas-reliefs of the ancient Assyrians give indication of the employment of "liquid fire" in war long before the Grecian era. Indeed, by some military historians, the use of chemical devices in war is regarded as probably as old as organized war itself.

In the field of screening smoke operations, the classic example is the "pillar of cloud" which screened the retreat of the Israelites by being miraculously interposed between them and the pursuing Egyptians (Exodus XIV—19). But prior to the World War, there are few examples in profane history of the deliberate employment of smoke for tactical purposes. One such was its use by Charles XII of Sweden in his campaign against the Saxons in 1701. On this occasion he executed a surprise crossing of the Dvina River under cover of smoke generated by barrels of burning pitch loaded on barges which were floated down the stream.

TREATY PROHIBITIONS OF THE USE OF GAS

In recent times, prior to the World War, there are no known instances of the deliberate use of noxious gas as a military weapon. But there is evidence that such use of it was thought of, if not actually foreseen. For instance: the British admiral Dundonald, investing the city of Sevastopol in the Crimean war, submitted a plan to his authorities to subdue the fortresses of the city by smothering them with fumes of burning sulphur. The British government frowned on this project and it was not employed.

Since the World War, clauses prohibiting the employment of toxic gas as a war-weapon have been incorporated in a number of treaties. None of these treaties, however, has been ratified by all military powers.

Some nations in furtherance of, or as interpreting, their treaty commitments with respect to toxic gas, have avowed and published a policy to abstain from the use of such gas in war, provided their enemy or enemies agree to do so. Today, however, the armies of most all the great military powers include troops equipped with special devices for use of chemicals. All of these powers maintain establishments which not only provide chemical warfare research and gas-protective equipment, but also devise methods of training in measures of gas protection. The reason for this is plain: So devastating are the effects of the surprise use of chemicals against unprotected personnel, that in a war between first class powers, certainly, no nation would now risk sending its troops into the field without gas training or gas masks. Indeed, it will be prudent in future war to regard every smoke cloud with suspicion, for it may be the mask of a gas attack.

Of all the many thousands of noxious chemical compounds studied for their military value during and since the World War, only a dozen or so are of recognized military importance today. There is, of course, always a possibility of some new and secret discovery. But the likelihood of a chemical discovery of vital concern—for instance, some new substance which will readily penetrate our gas masks

and render them useless—seems very slight. Mustard gas appears to hold its place as perhaps the most dreaded of all the war chemicals.

In means of dissemination of gas, an outstanding post-World War development is the adaptation of the airplane as a vehicle for chemical attack, either with gas bombs or chemical spraying apparatus. However, this method, at least in a war between first-class powers, remains untried. Another development is the improvement upon World War types of chemical mortars to make them suitable for use of chemicals in mobile operations as well as in stabilized warfare. In addition to improvements in weapons and technique, there is obviously a much wider and more thorough understanding of chemical warfare tactics among professional military men today than was generally the case in the World War.

Against these developments, considerable progress has been made since the World War in means and measures of gas protection. Efficient as were our World War gas masks, they probably would be regarded as intolerable by present day soldiers accustomed only to the highly comfortable masks which we now have. In other respects, also, there have been improvements in gas protection. However, should there ever be initiated a widespread use of chemical spray from low-flying aircraft, all defensive measures would be subjected to a severe strain.

It seems probable that only a war in which chemicals are employed extensively can tell us to what degree the measures of protection may offset chemical offensive power. In the lack of such conclusive evidence, we must fall back upon World War experience as our only definite guide. Little as we were prepared for chemical warfare, when we entered the World War, our troops from the outset were at least provided with gas masks. Despite this fact, enemy gas accounted for more than one-fourth of all our battle casualties. Of these, more than one-third were due to mustard gas, against which, as already stated, the

mask is only partial protection. But here are the figures from the Surgeon General's records:

Battle Casualties—American Expeditionary Forces (Army)

Type of Weapon	Total Casualties	Killed on Battlefield	Died in Hospitals	Total Battle Deaths	Deaths in % of Total Casualties
Gas	70,752*	200	1,221	1,421	2%
All Others	187,586	34,049	12,470	46,519	25%
Total	258,338	34,249	13,691	47,940	—

* Of these 27,711 or 38% are known to have been caused by mustard gas.

World War experience indicates that it may be expected that well-executed gas attacks will always cause some casualties. Only by constant training in the development of proper gas discipline can we hope to keep such losses from being excessive. Indeed, in the World War, it was generally the case that the well-trained units were those that suffered the least.

CHEMICAL AGENTS

The substances employed in chemical warfare for tactical purposes are called chemical agents. The means or munitions used to disseminate chemical agents are referred to as chemical weapons.

In the tactical use of chemicals, the principles of mass and surprise are of outstanding moment. Of these two, probably the principle of mass is the more important, because, when gas is used in tremendous quantity, even the forewarned cannot escape its effects entirely. It, therefore, seems improbable that any nation lacking readily accessible supplies of raw materials and chemical plant facilities

needed for manufacture of chemical agents in great quantity, will be the one to initiate use of toxic gas in war.

Of all the new developments of war, "poison gas" most lends itself to the play of the journalist's imagination. Frequently, we see an account in newspapers of some new gas, alleged to be of such potency that but a small quantity of it released in a city would wipe out the population. Such stories are myths. Now, one of the great marvels of Nature is the self-purification power of the atmosphere. To realize this we have only to think of the tons upon tons of poisonous vapors belched into the air from chimneys in any great industrial center. Were it not for this self-purifying power of the air we all, long since, would have been dead. At best, in use of gas as a weapon, man can only temporarily circumvent these forces of Nature. But even if there is some element of truth in such stories of chemical discoveries, there is still a vast difference between some test-tube curiosity compounded in a laboratory, and a chemical of proven military value.

To be suitable for war purposes a chemical must meet a number of stringent requirements. First of all, it must possess the requisite toxic, smoke-producing or incendiary properties. The raw materials from which it is made must be readily available in great quantity, and there must be suitable chemical plants for the manufacturing processes. The agent must be fairly cheap to produce. It should be non-corrosive to a metal container, stable on storage, and, if it is a gas, it must be heavier than air, and it must be readily capable of liquification so it can be loaded in munitions of suitable size for handling in the field.

These requirements limit greatly the number of compounds practicable for war use.

Chemical warfare research has led to the classification of chemical agents in fairly well defined groups. It is believed that the properties of any new chemical agent which may be discovered will, in the main, conform to those of some one of these known groups. It is, then, only necessary to know the characteristics of the most representative, or

type agent, of each group, in order to have a fair understanding of all chemical agents.

With such an understanding we then have to consider another aspect of the matter. For instance, if a man is in the path of a bullet he is injured, but a man exposed to a gas cloud may or may not be injured. If he is wearing an efficient gas mask, certain types of deadly chemicals can do him no harm, but other types may still make him a casualty. If the exposure is very brief, he may sometimes escape injury, but if it is prolonged, he may succumb to the gas even though there is little of it present in the atmosphere about him. In the case of some chemicals, a man walking along a hard-surfaced road may get off scot free, while his neighbor brushing through a near-by field covered with dense vegetation may be severely injured.

A knowledge of the physiological action of war chemicals, as well as of their physical behavior in the field, therefore, is essential for the adoption of intelligent means of protection against them.

We come now to another outstanding difference between physical and chemical warfare, namely, the extreme variability in effectiveness of chemicals due to the influence of weather conditions. In the use of firearms, effects are relatively constant. A bullet has a certain penetrating power, a certain range, and these do not change appreciably night or day, summer or winter, rain or shine. But in chemical warfare, wind velocity and direction, rising air currents due to radiation of heat from the ground, temperature changes and rain are all important considerations. For example, mustard gas, a slowly evaporating liquid, if put down on an area when the weather is cold may lie there inert or freeze, giving off its deadly fumes only when the temperature rises.

It is necessary, therefore, to understand the influence of weather on chemicals when discussing the terms *persistency* and *concentration* which are of vital import in the tactical use of war gases. Because of this it is advisable to consider the subject rather closely. As brought to the battlefield, loaded in shell or other containers, all chemical

agents are in a liquid or solid state. Some agents, upon their release by opening of their container, vaporize at once and are soon dissipated. With some, considerable heat is required to vaporize them; consequently they are used in burning type munitions. Still others remain as liquids for an appreciable time after their release in the open, gradually giving off toxic vapor to the atmosphere. The rate with which a substance passes into a gaseous state when it is released is referred to as its *persistency*. This matter of persistency is very easy to understand, if we think of it with respect to household chemicals with which we are all familiar.

We have an apt illustration of varying degrees of persistency every time we visit a gas-filling station for service of our automobiles. We know that if gasoline is spilled on the fender of the car or on the concrete slab, the liquid will soon disappear. But if water is splashed it will leave a wet spot for some time, because water evaporates more slowly than gasoline. In other words, water is more persistent than gasoline. Now if motor oil is dropped it remains for a very long time. It evaporates still more slowly than water. It is highly persistent.

These same effects are found in use of war chemicals. Differences in persistency are due primarily to certain inherent properties of the chemicals. We need not consider these properties here; but we are interested in the fact that the persistency of any given substance is variable, depending upon outside influences. We must know what these influences are and the effects they produce. Here, we can use another homely illustration: The laundress wrings out the clothes before she hangs them on the line to dry, for she knows that the more water she leaves in them the longer they will stay wet. In the tactical use of a chemical, the more of the substance put down in an area, the longer it will remain effective. Now, in the case of the family wash, if the sun is shining and the air is warm, the clothes will dry faster than if the sky is overcast and the air is cool. Furthermore, when the wind is blowing, the clothes will dry faster than when the air is still. Similarly, in chemical

operations, the warmer the weather and the faster the air is moving, the quicker the chemical will evaporate, the lower will be its persistency. Hence it is that in the use of a highly volatile substance, such as phosgene (CG), which vaporizes almost immediately upon its release, cool weather is favorable, because in such weather rising air currents due to radiation of heat are absent. But in the use of mustard gas warm weather is desirable. This substance, compared to phosgene, vaporizes very slowly, and practically not at all in very cold weather. Heat is needed to get a sufficient amount of the chemical into the air for it to be effective as a gas. Persistency, however, is not something which we can determine accurately in the field. Its estimation is a matter of judgment based upon knowledge and experience.

Intimately associated with this matter of persistency is *concentration.* This term refers to the amount, by weight, of a substance present in a unit volume of air. It is not practicable to determine gas concentrations accurately on the battlefield, but we can estimate whether, as a result of any fire, the gas concentration in a certain area is high or low, effective or non-effective. And if we happen to be in a gassed area ourselves we can usually tell whether the concentration is high or low by our sense of smell. Now, the importance of concentration is this: the higher the concentration the quicker and more virulent the action of the chemical. The time factor is intimately associated with concentration. With most war gases, physiological effects are cumulative, so that a long exposure to a low concentration eventually will produce the same degree of injury as brief exposure to a high concentration.

Ammunition requirements for chemical operations are calculated on the basis of the number of pounds of the chemical required to produce an effective concentration on a unit area under average conditions. As weather conditions tend toward the unfavorable, more than the stated amount of ammunition must be used to produce such a concentration; and under some conditions it may be impossible to develop an effective concentration no matter how

much chemical is used. For instance, rain destroys most war chemicals by chemical action, by physically beating them out of the air, or by draining them off the ground. A high wind (above 12 miles per hour) usually will blow the gas away and dissipate it faster than it can be put down. Strong convection currents (rising air currents) have a similar tendency. In the case of such an agent as mustard gas, if it is fired at night when the ground and air are cool, the amount of toxic vapor in the air may scarcely be perceptible until the sun comes out. But it should be realized that the entire target area is more or less saturated with liquid mustard which in itself is highly effective in producing casualties. Later, when the ground and air are warm, a high concentration of toxic vapor will develop.

There is still another important factor outside the properties of the chemicals themselves, which affects their tactical use. That is terrain. In woods, wind velocity is retarded and, moreover, the ground in woods is usually comparatively cool so that there is little or no convection. Consequently, if gas is placed in woods it tends to remain effective there longer than it does in open areas exposed to wind and sun. Woods are an ideal target area for gas.

War gas is heavier than air, and although when released in the open it will diffuse and disappear even where there are no air currents, this may take some time. Initially, because of its weight, the gas tends to hug the ground. Moreover, it flows downhill, more or less like water, and tends to collect in ravines, gulleys, trenches and other depressions, remaining effective there for some time after it has cleared away from hilltops and open areas. If placed initially in such areas, it tends to stay there in high concentration. Targets in low ground therefore are more favorable for use of gas than are those on high ground. In the case of liquid, skin blistering agents—such as mustard gas—the most suitable target areas are those covered with high grass or other dense vegetation, because men, passing through such a gassed area, cannot avoid brushing off droplets of the liquid onto their clothing and being injured

because these agents quickly penetrate ordinary cloth.

Having in mind all these variable influences on the action of war chemicals, let us now consider the principal agents themselves. A tactical commander employing chemicals is primarily interested in whether the chemical is a gas, a smoke, or an incendiary substance; and, if it is a gas, whether it is persistent, or nonpersistent; lethal, or merely one which will harass an enemy by forcing him to wear a mask.

In the light of present knowledge of chemical agents, it is now considered possible to classify them all on this broad basis as follows:

Gas, nonpersistent
Gas, persistent
Gas, irritant
Smoke
Incendiary.

The term *gas* as here used is defined as applying to a chemical agent, which, in field concentrations, produces a powerful physiological effect.

A *nonpersistent gas* is one which, when released in the field, will be dissipated rapidly under the influence of a wind of low velocity. All other gases are considered *persistent.*

The term *irritant gas* is used in reference to those chemical agents whose toxicity, in concentrations producible in the field, will not cause death.

A *smoke* is a chemical agent, whose principal effect, when released, is the production of an obscuring smoke.

An *incendiary* is a chemical agent whose principal effect, when released, is the generation of sufficient heat to cause the ignition of substances with which it is in contact. (See Table I)

TABLE 1
TABULAR SUMMARY OF CHEMICAL AGENTS
TYPICAL EXMPLES—CHARACTERISTICS

TYPICAL EXAMPLES				CHARACTERISTICS		
Class	*Primary Tactical Use*	*Name*	*CWS Symbol*	*Odor*	*Persistency (at 68° F) (Under Field Conditions)*	*Suitable Munitions*
Nonpersistent Gas	Casualties	Phosgene	CG	Green Corn	Less than 10 minutes on open ground.	Livens projectors; cylinders; chemical mortar shells; medium howitzer shells.
Persistent Gas	Casualties; Neutralization	Mustard Gas	HS	Garlic	Up to one week depending on method of dispersion.	Light and medium artillery shells; chemical mortar shells; airplane bombs or spray.
Irritant Gas	Harassing	Adamsite	DM	Not pronounced	Period of functioning of munition (about 10 minutes with DM candle)	Candles; burning type bombs.
		Chloracetophenone	CN	Apple Blossoms	Period of functioning of munition.	Burning type munitions.
		Tear Gas Solution	CNS	Fly paper	About two hours for effective concentration.	Light and medium artillery shells; chemical mortar shells; small air bombs; air spray; explosive grenades*
Smoke	Screening	White phosphorus	WP	Matches	Burning time of phosphorus particles	Chemical mortar and artillery shells; grenades*; airplane bombs.
		Sulphur Trioxide solution	FS	Acrid	Period of functioning of munition.	Cylinders; airplane spray; chemical mortar and artillery shell.
		HC Mixture	HC	Acrid	Burning time of the munition.	Smoke pots; grenades*
Incendiary	Cause fires	Thermit	Th	None	Burning time of the munition.	All types of explosive shell; air bombs; grenades.

*Smoke pots and chemical grenades are suitable for training but are not classed as war munitions.

NONPERSISTENT GAS

A typical example of a nonpersistent gas is phosgene (symbol CG) which, in concentrations producible in the field, may cause death. Phosgene acts directly upon the lungs, causing air cells to fill with fluid from the body. The process of respiration thus is retarded or stopped entirely. If the concentration is high, casualty effect takes place rapidly after a few breaths. If it is low, the first symptoms of asphyxia—catching of the breath, choking, coughing—are usually delayed. The service gas mask provides complete protection against phosgene and all other agents of the nonpersistent class.

Phosgene is somewhat corrosive to metal, especially if moisture is present. It can be identified in the field by its rather pleasant odor, frequently described as like that of green corn or new-mown hay. Phosgene is a commercial product and is used in the manufacture of certain perfumes and dyes.

A number of outside factors affect the use of nonpersistent gas. Gas clouds expand and move with the wind, becoming more and more diluted as they travel. The distance traveled by the gas before it is dissipated depends upon the amount of it released and the weather conditions. In a large gas cloud attack against the British during the World War, gas casualties were produced some five to six miles from the area where the gas was released. In another case, a tremendous cloud launched against the Russians was reported effective at a distance of 10 miles from the source.

Cool, cloudy weather with low wind velocity, from 3 to 12 miles per hour, and little or no convection currents, favors the employment of nonpersistent gas. Rain destroys it. Favorable meterological conditions obtain frequently at night and during the early morning. It is, therefore, at such times especially, that nonpersistent gas attacks may be expected.

In the tactical use of nonpersistent gas, adherence to the principles of surprise and mass is essential. For appreciable casualty effect a large quantity of ammunition, fired

rapidly, is required. Once personnel in the target area have adjusted gas masks, continued fire of such gas cannot be counted upon for more than harassing value.

Since the gas is soon dissipated (10 to 60 minutes after release depending on weather and terrain), it is essential also that the area fired upon be occupied at the time of fire. Moving bodies of troops usually are unprofitable targets for nonpersistent gas. In view of these considerations, nonpersistent gas is more suitable for use in attack than in defense.

Nonpersistent gas may be disseminated by cylinders emplaced in friendly lines, the gas being released when the wind is such as to blow it into the hostile position, or it may be employed in projectiles to discharge the gas directly upon the target.

PERSISTENT GAS

An example of a typical persistent gas is mustard gas (symbol HS) which, in concentrations producible in the field, may cause death. Mustard gas is an oily, slowly-evaporating liquid, characterized by its vesicant, or blistering, action. The substance is highly persistent. Its period of effectiveness, after its release, varies from several hours to several weeks, depending on the amount dispersed and the weather conditions. HS can be detected in the field by its odor which is like that of garlic. The vapor of mustard gas will penetrate ordinary clothing and produce blisters on the skin which may develop into deep wounds. Even in very low concentrations, this vapor will cause severe inflammation of the eyes and, possibly, temporary blindness. Breathing of the vapor results in serious inflammation of the lungs, and frequently results in secondary pneumonic infection. Casualty effect from exposure to mustard gas is delayed. In the case of the vapor, it does not take place until several hours afterwards. The substance, in liquid form, acts much more quickly and with greater severity. The action of mustard gas is local. The somewhat similar agent, Lewisite (M1) in addition to being a vesicant, is a

systemic poison, and if absorbed in the blood acts upon the heart.

Mustard gas is very penetrating and will contaminate practically anything with which it comes in contact rendering the article dangerous to touch. This contamination is particularly severe in cases of splashing or spraying of the agent in liquid form. Removal of the toxic substance is difficult and in many cases impracticable.

For protection of the body against mustard gas and other agents of its type, special clothing which completely covers the body is required in addition to the gas mask.

When persistent gas is dispersed, some of it passes immediately into the atmosphere as vapor. A considerable portion of it, however, is deposited, in unvaporized state, on the ground and vegetation. If the area is wooded or covered with other thick vegetation, a person passing through it can scarcely avoid brushing off some of the toxic substance onto his clothing. The danger of such gas, however, is not confined to the area in which it is released. As the chemical gradually evaporates, the toxic vapor is carried for some distance downwind before it is dissipated. The downwind danger distance from a persistent-gassed area varies according to the size of the area, the degree of contamination and the atmospheric conditions. In the case of a large contaminated area, this distance may be a thousand yards or even more.

Warm, dry weather favors the use of persistent gas, since the higher the temperature the greater the vapor concentration produced. Mustard gas is unsuitable for use in freezing weather, but M1 can be used effectively in low temperatures. Rain tends to destroy persistent gas but mustard is less affected by water than others.

Persistent gas is suitable for many tacitcal purposes. It can be employed to contaminate ground and so deny use of important terrain. It is suitable for interdiction and counterbattery fires. It can be employed for contamination of equipment and supplies, or it can be fired against personnel for casualty effect. By reason of its persistency, time and other tactical considerations permitting, it can be

fired at a slow rate. It is suitable for use against small as well as large targets. However, it is essential, in employing persistent gas, that it be confined to areas which the user's troops can avoid while the gas remains effective. There is, therefore, a greater variety of opportunities for its use in defense than in attack.

Persistent gas may be disseminated by explosive projectiles, air bombs, airplane or other spraying apparatus, or by static means.

IRRITANT GAS

Agents of this class are those which, in their physiological effect in concentrations producible in the field, will incapacitate for varying periods, but which will not produce death. They may or may not be persistent, depending upon the method of their dissemination.

An example of an irritant gas is Adamsite (DM). It is a solid substance which is dispersed in the form of smoke consisting of minute solid particles. These particles will pass through the protective chemicals in a gas mask canister unless the canister includes a special sort of mechanical filter to exclude them. DM is a so-called sternutator. It causes severe irritation of the nose and throat and produces headache and nausea. It is nonpersistent and has no pronounced odor.

The lacrimators, or tear gases, also belong to this class. An example is CN, a solid crystalline substance which is dispersed in nonpersistent form by burning. It causes intense eye irritation and some irritation of the skin. In very low concentration CN smells like apple blossoms. A somewhat similar agent is CNS consisting of CN in solution with other chemicals. CNS persists from one to ten hours in summer and from six hours to one week in winter. At 68 degrees Fahrenheit CNS is effective, on average terrain, for about two hours. It causes violent eye irritation, vomiting, and mild skin itching. It has a sweetish odor, described as like that of fly paper.

The physical behavior of irritant gas in the field is like that of the other gases discussed.

Irritant gas of one sort or another may be employed effectively in all kinds of weather except rain and high wind. The increased discomfort of gas masks, when the temperature is high, makes its use in warm weather particularly effective.

Irritant gas is intolerable, even in low concentration, and, therefore, is an economical means of forcing the use of gas masks. It is especially adapted for use in night fires, to hamper, disturb rest, and lower morale. Irritant gas can be employed in conjunction with HE or smoke. It is not suitable for use in connection with lethal agents employed for surprise effect.

In general, the best method of dispersing irritant gas is by explosive shell. Certain types, such as DM and CN require the use of burning type munitions. CNS can be dispersed by explosive shell or it can be sprayed from airplanes.

SCREENING SMOKE

To meet different tactical requirements, three types of smoke agents have been developed. They are as follows:

(1) White phosphorus (WP).—For dispersion by chemical mortar and artillery shell and by airplane bombs. White phosphorus smoke is the most effective obscuring agent known. The phosphorus burns spontaneously on exposure to the air, but requires an explosive to break it up and disperse it. The smoke is harmless, but the burning phosphorus particles may have severe casualty effect. They have also some incendiary action which, at times, may be disadvantageous to the user of this agent.

(2) A liquid mixture known as FS.—This agent fumes on exposure to the air and is suitable for laying smoke screens with airplanes. FS is also a suitable filling for chemical mortar and artillery smoke shell used in training. The smoke, itself, is harmless in the field, but the liquid is corrosive. Personnel beneath low-flying planes laying smoke should protect their eyes from droplets of

this liquid. In training and demonstration operations, vehicles, whenever practicable, should be kept upwind of the path of airplanes laying smoke, since the droplets of FS will damage paint work.

(3) A solid mixture known as HC.—This is suitable for use in filling certain burning type munitions such as smoke pots. This smoke is harmless.

The production of smoke is accompanied by the evolution of heat. Smoke clouds, therefore, tend to rise faster than gas clouds. Like gas clouds, they travel with the wind, spreading out and becoming thinner as the distance from the source of the smoke increases. Continued production of smoke is required to maintain a screen for longer than a few minutes.

Cool, cloudy weather, when there is little or no convection (rising air currents), favors the production of smoke screens. The wind should not be above 10 miles per hour. A high humidity is desirable, since water vapor, some of which is always present in the air, is required for the production of smoke. A very fine mist is favorable. Rain destroys smoke. White smoke, which refracts light rays, is much more effective for *obscurance* than black or colored smokes.

Smoke is used to deny information to an enemy of activities on the battlefield, and to reduce the effectiveness of hostile fire.

Smoke has many specific tactical uses. Among them are: screening attacking troops, neutralization of hostile machine guns and antitank weapons whose general location, only, is known; screening movement of tanks; neutralizing hostile antiaircraft weapons; deceiving an enemy as to the direction of an attack; screening a daylight withdrawal, and misleading an enemy as to the point where the crossing of a river is to be made.

In general, the best method of laying smoke screens in support of ground troops is by explosive projectiles. Airplane spray and candle methods may, at times, be suitable.

INCENDIARY AGENTS

Various mixtures such as thermit (Th), which, on burning, generate great heat; solid oils, and other highly inflammable materials may be used as incendiary agents to cause destruction by combustion. Chemical mortars, artillery, airplanes, and grenades may be employed to disseminate such agents.

All the foregoing indicates that the employment of chemical agents of any sort may have an important influence on tactical operations. In some cases, either smoke or gas, if used in assistance of one unit, may operate to the serious disadvantage of another. It is considered, therefore, that chemical missions, including decision as to the general class of agent to be used, should be coordinated and prescribed by the commander of all troops concerned.

Gas is mainly a weapon to be used against personnel. Since this is so, and since infantry comprises the bulk of the Army, all infantry officers should understand the powers and limitations of war chemicals. It is only with this knowledge that protective measures can be devised and applied. General John J. Pershing summed the matter up tersely in his final report as commander of the A. E. F. He said: "Whether or not gas will be employed in future wars is a matter of conjecture, but the effect is so deadly to the unprepared, that we can never afford to neglect the question."

CHAPTER 4

Coup d'Oeil

(INFANTRY SCHOOL STUDY)

"It is a faculty to be able to grasp instantaneously the relation of the ground with the general nature of the country; it is a gift called an eye for the ground, which great generals have received from nature."

—Napoleon.

Occasionally there flashes across the military scene a man possessing what the discriminating French have aptly termed *coup d'oeil*—an instantaneous understanding of the uses of terrain to suit a particular military purpose. This ability to single out quickly and to utilize unhesitatingly that essential feature of the terrain which means victory, differs greatly—although giving similar results—from a detailed study such as a formal estimate of the terrrain. This does not mean that we are in any manner belittling a general terrain estimate. These estimates are necessary in conducting successful military operations. It was such an estimate, undoubtedly, that Lee made when he chose to fight Grant in the Wilderness. No one questions that Lee, in striking Grant in the Wilderness of Virginia, made the most of that tangled maze and his own limited numbers. To maneuver on such ground was certainly difficult yet the locality was ideal for the pitting of knowledge of the ground against Grant's superior numbers. Likewise, Hooker's use of the Rappahannock to shield his really brilliant move against Lee at Chancellorsville gives us another outstanding example of a carefully thought out campaign

based on well considered terrain values. We can say this even though Hooker met a disastrous defeat at the end. History records many instances where this general knowledge and use of terrain were vital to success. But even the best of these examples is not *coup d'oeil.**

This *stroke of the eye,* this ability during the stress of battle to pick out promptly the one critical feature among all others, is something apart from long deliberation and strategical analysis. And soldiers possessing this quickness of terrain perception are difficult to find. For a hundred men who can make a terrain study and arrive at a sound conclusion, there is scarcely one who possesses *coup d'oeil* or endeavors to develop it. Strange, when we consider the tremendous rewards given to its possessors. Quick, direct, and simple, *coup d'oeil* often produces dazzling results. When brought to our attention, we cannot refrain from remarking on the utter obviousness of the whole matter and at the same time wondering about the lack of perception of those who failed to see the significance of a key terrain feature. It seems inexplicable. Why should one man pick out in a flash the only terrain that satisfies the tactical demands when many others who are present and with the same or better opportunities fail to do so? Must an otherwise ordinary soldier be a prodigy, a lightning calculator in terrain values, or is it a matter of training? We should give this some thought, for terrain has assumed ever-increasing importance with the evolution of warfare.

In ancient combat a cleared hill with a long, even slope for a downhill attack was the answer to the centurion's prayer. The Greek phalanx and the Swiss pikemen asked for nothing more than an open field and room for the thick hedge of spears to maneuver. Give them sufficient cleared ground to keep their formations intact, and they were invincible. But along with the development of armament and means of transportation we can see the quiet,

* "Coo duh' ee" is a fair English approximation of the pronounciation of this rather tricky French phrase.

slow-growing influence of terrain, at first strategically, then tactically.

Gustavus Adolphus, the father of modern warfare, did not need to understand the modern tactical uses of terrain, because war as he knew it and the weapons he possessed did not demand the varied uses of the ground as it did in later years. In his time the tactical plan and the terrain imposed fewer restrictions on each other. Their mutual conditioning was simple and soft in nature. The tyrannical authority of terrain was as yet to be developed. As in ancient warfare a system of attack and defense based on the discipline and training of the men and the mechanical efficiency of the formations and weapons was still of paramount importance. For these reasons the successful methods of Gustavus Adolphus were copied by all the armies of Europe. Terrain was yet to assert its full influence.

A cursory glance at Turenne, Malborough, and Marshal Saxe shows Gustavus Adolphus over and over again. Frederick the Great improved on the formations of Gustavus by harking back to Epaminondas to copy the battle of Leuctra 371 BC. He thus popularized the principle of oblique tactics used at Leuthen. It will be observed that the stress then, as in ancient days, was on battle maneuvering and system. Although the strategic effect of terrain was fully appreciated in this era and while great fortresses were erected at strategical points—in fact, campaigns were likely to become a succession of sieges—nevertheless, the tactical, or battle aspect of terrain was relatively unnoticed. However, this last was beginning to make itself evident.

At Leuthen, though it is not often mentioned so intrigued are commentators with Frederick the Great's oblique tactics, we see the classical use of ground to cover a flanking maneuver. Napoleon has called this movement a masterpiece. What is often overlooked is that this is an excellent example of *coup d'oeil*. From his position on the hill at Scheuberg, overlooking the Austrian position, Frederick could see the hills behind which stretched the Austrian

line. He realized at once the significance of the ground as presented to his eye. These hills were the shield behind which he could launch his flanking maneuver. It was a perfect set-up for Frederick's favorite oblique order for the attack. Immediately he ordered his marching columns to change direction. Under cover of the rolling hills, they moved parallel to the Austrian front into their battle positions. Unseen, the Prussians attacked, surprised the Austrian left and won the battle. Had the Austrian commander possessed Frederick's quick eye for the terrain, Leuthen would not have been possible.

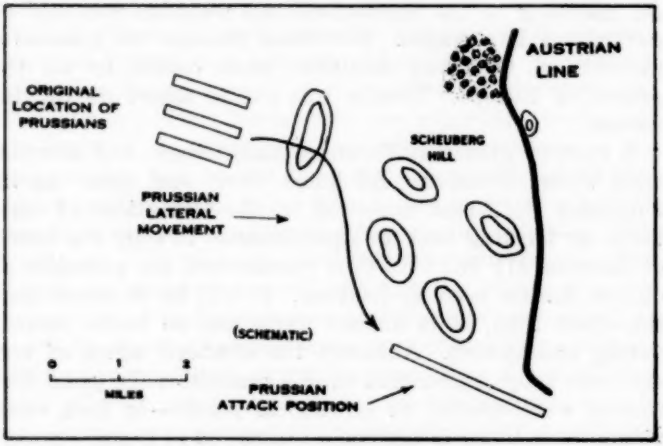

FIGURE 8.—Leuthen.

Let us not confuse the victory of Frederick at Leuthen with the tactics used. Oblique order, or any other order, would have won had it hit with the same surprise. It was not, as some think, the method used. On the contrary, it was the surprise gained by Frederick's ability to see the ground and use it. It was *coup d'oeil* that won Leuthen; for this difficult oblique order of attack was no guarantee of victory by itself alone. Against Napoleon it was a dismal failure—or rather, it never got a chance to function.

The fresh brilliancy of the Napoleonic era, in addition

to producing a Napoleonic method of warfare and adding impetus to the strategic conception of terrain, emphasized the eye for the ground—the tactical use of terrain. *Coup d'oeil* was reaching a stature appropriate to the role it was destined to enact. Thereafter, its prestige never diminished. An examination of a few historical examples will indicate its growth and importance.

In September 1793 the French Republican Army was besieging Toulon. Garrisoned by some 9,000 troops of mixed nationalities the town was dependent upon reinforcements and supplies coming from the sea. The British squadron based on the Toulon harbor covered the line of water communication.

The instructions to the General in Chief of the Republican Army contained the plan for a conventional siege. The General in Chief called a council of war to determine a plan of attack. For the purpose there were available 25,000 men and considerable artillery. Yet, it was estimated that the investment would require 60,000 men. The difficulties of the operation are as apparent to the reader as they were to the men of the council. These men, fearing failure—the guillotine dealt with unsuccessful generals—and yet not desiring to disobey the order of the government, were in a quandary. What to do?

Present at the council was a young major of artillery recently arrived. Placing his finger on the map to indicate one terrain feature he said: "Toulon is there." (See Figure 9.) In his opinion a regular siege was not needed. All that was necessary was to take this single terrain feature, which was located outside the town proper, place sufficient artillery there to cover the harbor and prevent access to the sea, and Toulon would surely fall. The suggestion was well received. The position was stormed and the artillery was promptly emplaced to cover the harbor. Under its fire the British fleet began to withdraw, troops left, supplies could not come in, and as Major Bonaparte, the artillerist, had foretold, Toulon fell. As simple as that. But this requires a Napoleon, some may think. Not at all. There have been men with far less prominent names, men

who never occupied a position of high command, yet they have successfully demonstrated their eye for the ground with amazing results. There was

PELHAM

It was June 2, 1862, the day after the battle of Malvern Hill. Stuart, with the Confederate cavalry on Jackson's left, started down the river to ascertain the position of the defeated enemy. He discovered that the Federal position at Malvern Hill had been abandoned. At the crossroads near Shirley, Stuart was held up by the enemy's rear guard. He spent the remainder of the day reconnoitering towards Charles City Court House. Finding no evidence of the enemy in that direction, he sent Captain Pelham with one howitzer and one squadron of cavalry toward Westover. Pelham found the Federal Army at Westover. (See Figure 10.) He saw the unoccupied heights of Evelington dominating the camps and trains of the Federal forces, all within easy artillery range. A glance at the map will disclose its importance. Pelham quickly and stealthily seized the heights. He informed Stuart immediately of the advantage that would be obtained by occupying these heights in force. Stuart received this message the night of June 2. Losing no time he joined Pelham with his cavalry on the heights the morning of June 3. Believing Longstreet's infantry close at hand and unable to resist the temptation in sight below him, Stuart opened fire on the Federals with Pelham's artillery. The effects of this fire were startling to the Federal command. McClellan and his subordinates realized they had overlooked a vital position and the army was in grave danger. They responded to this forced stimulation by an immediate infantry attack. The battle raged until 2:00 PM when Stuart, receiving no infantry support, was forced to withdraw. The heights were captured and became a Union line of defense.

As one Confederate participant saw it in later years: "Those heights in our possession, the enemy's position was altogether untenable, and he was at our mercy; unless they

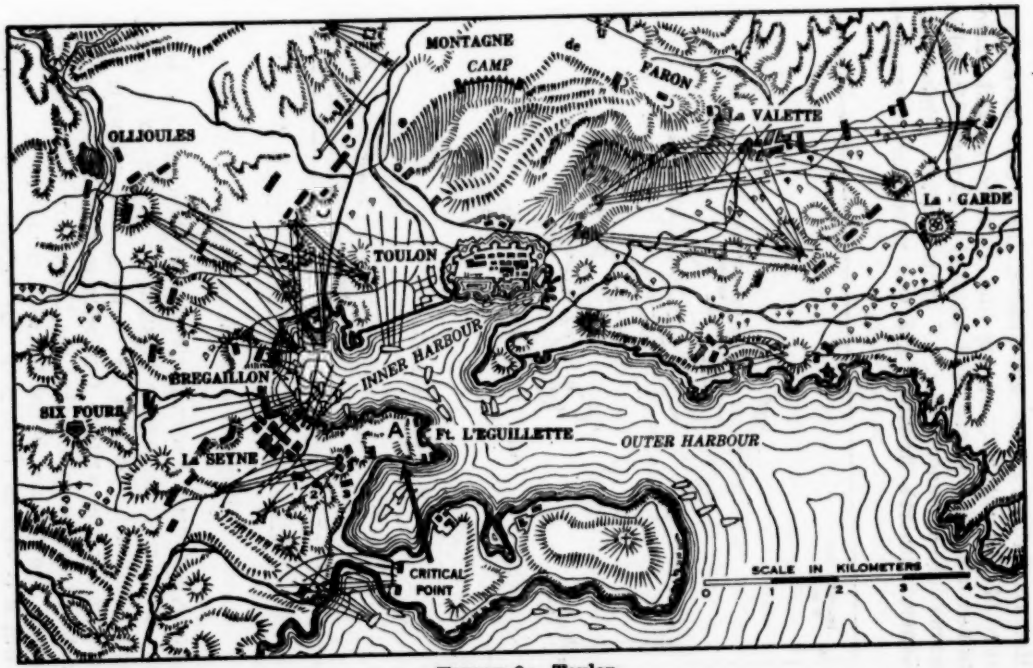

FIGURE 9.—Toulon.

could be recaptured, his capitulation was inevitable . . . Had the infantry been up, General Lee would have made sure of this naturally strong line, fortified it well, maintained it against assault, and dictated to General McClellan terms of surrender . . ." This writer thinks that General Stuart's howitzer fire was premature, even pre-

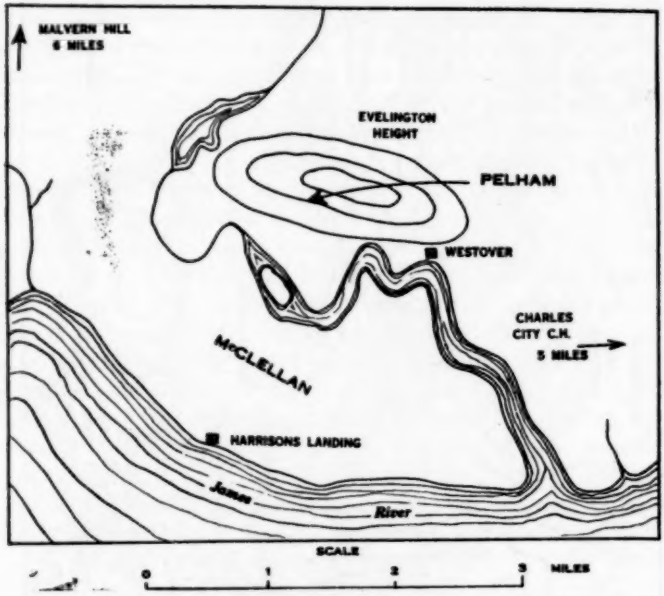

FIGURE 10.—Evelington Heights.

cipitate, and drew Federal attention to the heights so early that infantry could not be brought up in time to prevent their recapture. Be that as it may, and allowing full measure for the writer's Confederate sympathy, the very least that can be said is that the Union Army was in grave danger. How grave, is not for us to decide here.

But it is well for us to note that Pelham, a junior officer, had picked in an instant the key to a tactical situation, which, strangely enough, McClellan and his subordinates

had failed to see. Here, a simple captain demonstrated that his quick eye for terrain almost caused disaster for a great army.

And this was not an isolated case or a lucky guess. The "incomparable Pelham", as he was dubbed, was famous for such quick perception. Of him Stuart, his commander, said, "His coup d'oeil was accurate and comprehensive, his choice of ground made with the eye of military genius, and his dispositions always such in retiring as to render it impossible for the enemy to press us without being severely punished for his temerity." Perhaps the circumstances that prevented McClellan's defeat were indelibly woven in the fabric of fate. But the result detracts not one whit from Pelham's ability to see unerringly that critical feature of the terrain which, fitted into the tactical pattern, gave a chance for a complete victory.

In a similar situation, with a more propitious ending, there was

WARREN

It was July 2, the second day at Gettysburg. At 3:30 PM General Warren, by direction of the Union Commander, General Meade, was reconnoitering the left flank of the Union position. The sensitive and intuitive Warren had ridden at once to the massive heights of Little Round Top. He found it undefended save for a few signal men about to leave on account of a large body of Confederate troops they thought were in the woods along the Emmitsburg Road to their left front. If these heights had seemed important before, they now, undefended against a probable successful attack, shouted a warning to Warren, the engineer. Should Longstreet, the Confederate general on this wing, take this critical hill, Meade's left was wide open. Hit in flank and enfiladed by artillery fire, it would be crushed and the Union Army would be doomed. These thoughts impinging on Warren's consciousness caused him to send an orderly racing down the hill to ask Captain Smith, commanding a New York battery, to fire one shot

in the direction of the woods. When the shot was fired it caused a movement in the Confederate ranks. Warren was on the alert, and through the foliage saw the sunlight flash from the bayonets of the soldiers. This slight disturbance

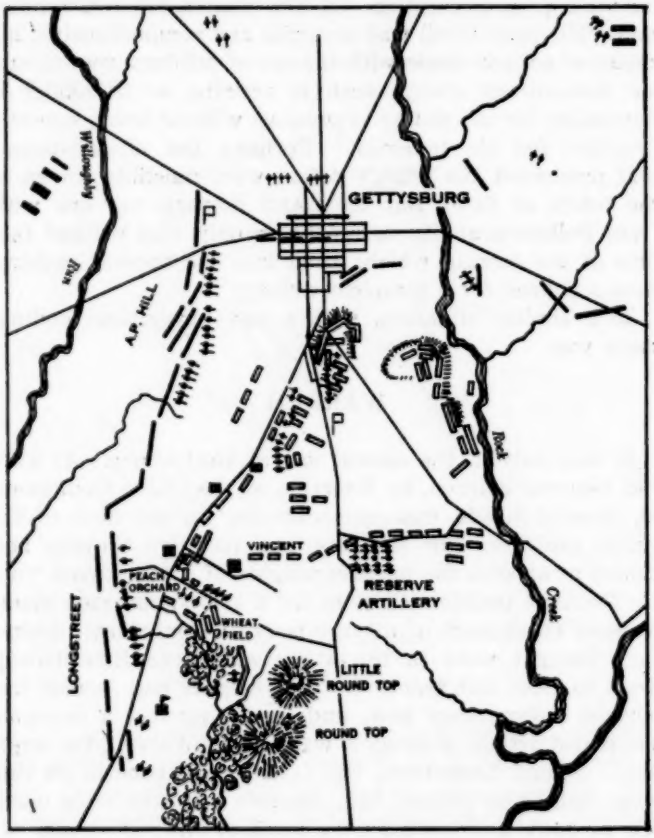

FIGURE 11.—Gettysburg.

was sufficient. He had located the Confederate line! The suspicions of the signal men were confirmed.

Without further deliberation and with no authority,

Warren hurriedly sent an aide in anxious search of a brigade to hold Little Round Top. Sickles was appealed to but could not respond. So a staff officer carried the appeal to Sykes. Luckily, this staff officer in seeking Sykes encountered General Strong Vincent at the head of his brigade. Vincent heard the situation outlined and on his own responsibility moved his brigade to the south and southwest slopes of Little Round Top. Meanwhile, Warren in frantic eagerness, hurried down the slopes and met by chance Colonel O'Rorke of Weed's brigade. O'Rorke, like Vincent, moved to the summit of Little Round Top. At that moment the Confederates were swarming up the slope. They attacked in smashing force. The terrific struggle for supremacy lasted for hours but ended with Little Round Top still in Union hands, a gigantic buttress on the Union left. It was Warren's *coup d'oeil*, and Vincent's and O'Rorke's instant response that enabled the Union Army to retrieve a fatal oversight. A fifteen-minute delay and Gettysburg might very likely have been a Confederate triumph.

It is evident that on this day at Gettysburg the correct tactical use of the ground was the determining factor. And it appears to be simplicity itself. Yet in considering the trained officers who failed to appreciate the value of Little Round Top, until Warren brought it to their attention, is it as simple as it seems? What is there to it?

But before analyzing the nature of *coup d'oeil*, it might be well to point out this: the fundamental reason underlying the steadily increasing importance of the tactical use of terrain during the modern era is, primarily, because no longer can masses or groups of men remain in view on the battlefield and live. Troops seen are troops destroyed. Therefore, troops must be concealed, and terrain must be used to do it. All this is brought about by the development in arms—the evolution of terrific firepower driving men to seek cover that only the earth affords. Furthermore, this firepower can be maneuvered almost at will; no longer must we mass guns directly in front of a position. From widely separated localities we can call to our purpose all

the destructive power of modern weapons and concentrate it on a sensitive point. Thus, firepower drives the soldier below ground and drives the commander to use ground to the utmost. What a change from Napoleonic days or even our Civil War! Then, massed bodies of troops 800 yards from the firing line were comparatively safe. Today such masses within 5,000 yards of the front are under the observation of aviation and may be smashed to a pulp by artillery fire.

Unquestionably, terrain in modern war must be used to the maximum. All ranks must be skilled in utilizing it. The very privates must know how to take advantage of folds in the ground, small hillocks, ravines, clumps of brush or trees, and the like. They must be able to use it not simply to save their lives, but to carry out the scheme of maneuver. Battlefields are not bright and colorful, with fluttering flags and massed troops in brilliant uniforms advancing to the attack as Marshal MacDonald did with a whole corps at Wagram. The uniforms are drab today, no flags wave, and the battlefields appear deserted, except for small shadowy groups or individual men flitting from one terrain feature to another. No more are positions stormed in the old way, as at Missionary Ridge or Spottsylvania. On the contrary, men utilize the terrain skillfully, stealthily, to enable them to approach and carry the position from its weakest side. Thus, the finest trained and disciplined troops in the world will face certain destruction on the modern battlefield, unless leaders and followers know the possibilities of terrain and how to use the ground to carry through a scheme of maneuver. From this we can safely conclude that in the future it is a certainty that the soldier will be faced by countless terrain problems to solve. In fact, it is not unlikely that some officer, or even a noncommissioned officer, is alive today who will by his *coup d'oeil* greatly influence an important battle.

But exactly what is this *coup d'oeil?* Analysis of the examples indicates that roughly it is composed of two parts. The first is the ability to comprehend the larger tactical pattern and see in a flash how a piece of local terrain

fits into this pattern; the second is speed of decision and action.

The first part is a purely intellectual process. Although it seems so simple, once we have all the maps and charts before us, we cannot assume that it is a simple matter on the battlefield. The confusion naturally arising from tactical operations would seem to focus the minds of all on smaller matters; such as, what is happening in the front, how can order and control be maintained, how can directions be carried out, and the like. Preoccupied with this analyzing of and directing immediate things the broader picture in the minds of most soldiers grows dim or fades out completely. Only the very exceptional individual, or one carefully trained, can perform his normal combat duties and at the same time be aware, consciously or subconsciously, of the development of the greater battle pattern and how the terrain before him fits into it.

Surely, the first element of *coup d'oeil* is to see and this is a purely intellectual quality. The other, and perhaps the more important, part, as noted before, is the action flowing from this comprehension of the manner in which the terrain should be articulated to the battle tactics. And here we step out into a field that is not purely intellectual. We are dealing with moral courage, initiative, and a host of other intangible qualities. It is not enough to see, one must act.

That this action takes rare moral courage is seen in all three of the examples. The stripling artillery major at Toulon could have with propriety sat quietly by while the generals reached their decision. All he needed to know was where they wanted the guns placed. But he boldly stepped up—perhaps he may have been regarded as presumptuous. In any event, he spoke out. He said in essence: give me this ridge and I'll give you Toulon. He was betting his head that his judgment was right, for if his plan failed there was more than a good chance that he would ride the tumbrel to the guillotine.

Again, young Captain Pelham once he saw the Union forces and the key terrain feature unoccupied, had no

hesitancy in calling on a major general to bring up all the cavalry on the run. Today, junior officers even in maneuvers would think twice before calling on their own regimental commander to bring his regiment forward and take up a position which they had selected. And Warren at Gettysburg, with no command and no time to rout out troops, boldly appropriated for his purpose all the troops he could lay his hands on, despite the fact that they were designed for use elsewhere. He made up his mind that these troops were of more value on Round Top than anywhere else in the whole line. So he took them. For a staff officer to do such a thing, at any time, demands more than a normal degree of moral courage. It is true that if Warren had been wrong in his terrain conception, if he had taken troops from a vital part of the line to hold a strong but useless terrain feature, he would not have lost his head, but he might have lost for the North the most desperate and perhaps decisive battle of the war.

Another feature that strikes one in these examples is this: *speed*. There is speed in determining the value of the terrain feature, speed in deciding what to do, and speed in doing it. Nowhere along the chain of action—mental and physical—is there any indication of indecision or slowness.

In our brief analysis it may be admitted that we have not brought out all the factors that taken together make up *coup d'oeil*. But certainly the vital qualities are these: a quick perception of the value of terrain to the larger plan, moral courage to take the responsibility for action, and then action at a high speed.

The first is an intellectual process; the others, lumped together, comprise the leadership possessed by men of action. Thus *coup d'oeil* calls for skilled thinking and skilled leadership in one man. Yet Spengler, the great German philosopher and historian, has stated that men of thought and men of action are as far apart as the poles. Consequently, to find the two qualities naturally working together in one man is rare. This may be why we find so few individuals possessing this rare military quality, *coup*

d'oeil. On the other hand, it may be possible to train the intellectual qualities of a man of action or the leadership qualities of an intellectual soldier so that both acquire a high skill in this military field. True, Napoleon while he thought it a natural gift, still felt that training might help, for speaking of this quality he said, "Nevertheless observations which one may have been able to make on topographic maps, the facility given by education, and the habit of reading maps can be of some assistance."

In summing up this elusive quality we can say: the mind must be able to function under stress; it must see the nature of the problem, the relation of the part to the whole, the near-by terrain to the surrounding terrain, and then use the ground so conceived to assist the military situation and do it instantly. That is *coup d'oeil.*

CHAPTER 5

Rifle Company and Platoon in the Attack

(INFANTRY SCHOOL TEACHING)

In discussing the tactics of the rifle platoon and company, it is necessary to understand clearly that we are living in a day of change. As yet no army is satisfied. Everything seems to be changing. All are experimenting with the new. Because of this the military student if he wishes to develop tactically must now, more than ever before, understand the basic principles of infantry combat. He must not acquire the easy and pernicious habit of thinking that he is putting a *type* organization into combat. What he is doing is applying men and weapons to the terrain in order to solve a tactical problem. The type of organization he is handling is secondary; the way he handles it is vital. After all, any organization after a few hours of combat will bear little resemblance to the one prescribed in tables of organization.

In this discussion we will, as a point of approach, consider the organization at present under experiment at The Infantry School. We may expect certain changes and even the possibility that a quite different organization will come from the experimental process. Therefore, we have compelling reasons for studying carefully and understanding thoroughly the basic principles of infantry combat. Knowing these, any type organization that finally evolves and which contains trained men and modern weapons can be skillfully handled. True, one type organization may be better than another, but, granted a knowledge of fundamental principles, an officer can manipulate

even a poor type organization with good results. On the other hand, even a perfect organization cannot take the place of a knowledge of these fundamental principles.

For these reasons it is essential to obtain a firm grasp of the principles of infantry combat. Even that is not enough, for these principles need to be applied and that means acquiring not information but a mental skill. There is such a thing as knowing a thing perfectly but lacking the skill to use it. In this respect we might quote one American authority on mental functioning. "The skill at the ready command of intelligence is the skill acquired with the aid of intelligence; the only information which, otherwise than by accident, can be put to logical use is that acquired in the course of thinking. Because their knowledge has been acheived in connection with the needs of specific situations, men of little book-learning are often able to put to effective use every ounce of knowledge they possess; while men of vast erudition are often swamped by mere bulk of their learning, because memory, rather than thinking, has been operative in obtaining it."

From the above it is clear that reading this chapter in order to become familiar with or to memorize certain principles is wrong. Each item as it is brought up should be thought over carefully; let the intelligence play about it for a while, question it, if you will, do anything but do not soak it up sponge like. This last process, carried to the extreme, will only produce a person of great military erudition but fatally lacking in military skill. And there are too many such people, and always have been.

Then, in order to be sure that the reader acquires the principles in this chapter in connection with a "specific situation" rather than by memory; and gains a "skill at the ready command of intelligence," he should take up the problem in the following chapter and solve it. That will require thinking about a specific situation, intelligent application of principles to solve it, and will serve to develop military skill, the only reason in the world for ever reading a line of technical military writing. No battles were ever won by military scholars; but they are

won by men of action having great military skill directed by a keen intelligence.

This prelude to the discussion of the rifle company and platoon in the attack is believed necessary since too often a fund of military knowledge is believed to be the end of military instruction. This is not so. The end of military instruction—the objective, if you will—is the acquisition of military skill in applying correct principles. To know the principles means little, to have the skill to apply them means everything.

The foundation of infantry combat is the conduct in battle of the infantry soldier and the small infantry units —the squad, the section, the platoon, and the company. The principles governing the attack use of these small units are simple and easy to understand—but not to apply. True, anyone with a little study can intellectually master them, but it requires more than study to acquire the skill in applying general principles to a particular and concrete situation. And since skill is only acquired by *doing*, a thorough knowledge of the principles should be followed by a period of applying them. It must be repeated: *skill in doing and not mere knowledge is the objective.* Furthermore, modern combat demands that this skill be highly developed, because the thinking and the action which follows must be rapid for both will occur under the effective range of small arms fire.

Thus, the great problem, as can be seen, is the immediate and correct application of simple principles during the strain of battle. We must remember, always, that success in battle depends upon the successful application of principles by the small unit commanders and the correct execution of these principles by the unit. Regardless of the perfection of the higher commander's plan, if the details of carrying out that plan are not successfully executed by the company and platoon commanders—the plan must fail.

The methods employed within and by the small unit should be so familiar to subordinate leaders that the adoption of the one most suited to the situation will be

but a matter of seconds, not minutes. Time saved is essential in the attack and is often responsible for securing surprise. But even without surprise, the rapid movement of small units pushing toward their objective prevents enemy counter-measures being taken in time to stop the advance.

Furthermore, we cannot expect too much weighty thinking by the leader of any small unit, while under fire. In such cases to visualize him as always thinking clearly for any length of time, weighing carefully the advantages and disadvantages of any situation, as one would in a map problem room, is to expect too much of the human element. The most that can be hoped for under such circumstances is that the leader may be able to check over in his mind the principles pertaining to his unit that may apply and use the correct ones in evolving a simple plan —a plan suited to the situation and which can be applied promptly and vigorously.

The desirability for a high order of training is obvious, but it must be borne in mind that training alone cannot succeed without leadership and morale. The infantry attack is founded upon the fighting spirit and initiative of the private soldier; and the fearless, intelligent leadership of his officers and noncommissioned officers. Often we do not stress this aggressiveness and this fighting heart enough; we are too apt to assume that it exists. Yet bars or chevorns do not automatically create a leader, nor does a mere uniform create followers with the will to continue to push forward against apparently insurmountable odds. The heart must be there. Times change, people differ; never should we accept for granted that the driving, aggressive spirit exists in our organization. We must be sure. On the civil training of the soldier must be built a hard-driving military aggressiveness.

This aggressiveness cannot be over-emphasized. Most of us are familiar with the measures taken to inspire football teams prior to important games. If this aggressiveness is so important in a mere game, how much more important is it on the modern battlefield where an entire

team, composed of green men, will enter its first scrimmage in the face of every known form of deadly weapon? What will happen to this team if the spirit of aggressiveness has not been developed in all men so that it becomes second nature to advance?

The rifle company which we will discuss* is composed of a company headquarters and three platoons; each platoon comprises two sections. The section is composed of two rifle squads, armed with the semiautomatic rifle, and a light machine-gun squad. This platoon organization provides a large increase of fire power. However, the semiautomatic shoulder rifle cannot be expected in quantity for the present; no light machine gun has been developed. The light machine-gun squad, so-called, is equipped with the modified Browning automatic rifle. One should not confuse the modified Browning automatic rifle equipped with bipod and butt plate with the old type Browning. The new modifications allow the gun to be fired *automatically*. The old regulations insisted on using the Browning as a single shot weapon. It was really only an auto-loading rifle. The modified gun is an automatic weapon and is to be used as such.

THE RIFLE PLATOON

In studying the principles governing small infantry units in combat one can make a good start with the rifle platoon. For the rifle platoon is not only the smallest unit commanded by an officer but also the smallest that is subdivided into a forward or assault element and a support element. On the other hand, it is the largest unit composed entirely of men whose sole duty is fighting.

The platoon is employed in various capacities in combat. It may form a security, intelligence, or connecting group, and when so acting it conforms to the principles governing such groups. As part of a larger force, it is usually

* Experimental organization used at The Infantry School. It should not be confused with any other type organization.

assigned to either the assault or support echelon of its company. It may be sent on minor independent missions, but when so sent it constitutes in reality a strong patrol. For these independent missions it should be properly trained and equipped.

The combat formations of the platoon are simple; sections may be abreast, in column, or echeloned to one flank, with one or both sections in section column, squad columns, or skirmish line. Platoon headquarters is usually between sections.

The zone of action of the platoon is usually defined by assignment of an initial position and a direction of advance or an objective. It is practically impossible to define boundaries beyond the limit of visibility for the platoon; therefore boundaries between platoons are generally not assigned. The front of the platoon is definitely determined by its strength in personnel. The frontage of a platoon varies in every situation. Its zone includes areas or responsibility on the flanks to be utilized for maneuver or covered by the fire of the platoon.

During the approach march the platoon usually has considerable open intervals on its flanks, and it is therefore concerned particularly with maintenance of direction and rate of advance. Although assigned a direction of movement, it may deviate temporarily from that direction in order to pass around obstacles or dangerous areas which are not to be attacked, returning afterward to its axis of advance. Unless covered by other units or preceded by supporting fire, it covers its advance with scouts. The support section should be at such distance from the assault section as to provide it with maneuver space and yet not so distant that it is prevented from utilizing the effective range of its platoon weapons.

Let us consider a platoon advancing to the attack in approach formation before it enters the zone of effective small-arms fire; i.e., before it reaches the line of departure.

We see the following picture:

The platoon leader marches between the scouts and the leading section. He is watching the scouts, observing

the terrain to the front and flanks and seeing to it that his platoon is holding the assigned direction of advance. In his mind are the orders of his company commander. In so far as they apply to him, they are brief and simple. In one form or another, they embrace the following points:

(1) Place from which platoon is to start its advance (line of departure).

(2) Hour of starting (hour of attack).

(3) Area in which to operate (zone of action).

(4) Its assigned task (mission).

All should be clear, and easy to understand and remember.

When the platoon reaches the line of departure then, the method of advance will conform in general to the following:

Light machine guns first.

The riflemen, at least initially, will follow these guns, advancing by covered routes close to the guns.

If the terrain is such that the light machine guns can be emplaced on commanding ground, the riflemen may maneuver initially in advance of these guns providing, of course, the terrain offers sufficient concealment for their movement.

These light machine guns open fire on the hostile position as soon as in effective range. They cover each other in their movement forward, some guns moving while others fire. For these guns to advance, at least half of them should be firing, in order to keep the hostile position on the front constantly under fire.

The platoon leader must now make a prompt decision as to his method of advance. In employing his light machine guns he may use those of the leading section or have those of both sections forward, forming a "light machine-gun section" in the latter case.

While his leading section is moving into the designated firing position, the platoon leader makes such reconnaissance as time permits, constantly thinking of fire, movement and use of the ground in relation to his battle task in order to determine his future plan of action. His rear

section is held in a position from which it will not be subjected to undue losses, and at the same time will retain its ability to maneuver to either flank.

Once the leading section has reached its firing position, it attempts to advance farther by combining fire and movement. As soon as it becomes evident that this section cannot overcome the resistance unassisted, the platoon leader takes action to bring enough pressure against this resistance to break it. This pressure may be produced by procuring the fire of supporting units, the fire and movement of his rear section or a combination of both.

Generally, as far as the platoon leader is concerned, the limitation of time and the amount of supporting fire available make the immediate procurement of supporting fires on the targets desired out of the question. In the majority of cases his influence upon the situation can be measured only by his own resources; to wit, his platoon

Let us assume that a platoon finds itself in the latter situation. One section is firing and is unable to advance, the other is under cover to the rear. What may the platoon leader do?

He has the following choice of action:

(1) He may order the leading section to remain in place and then maneuver one or two light machine guns close to one of the hostile flanks from which position they will open surprise fire. The volume of this fire, coupled with its surprise effect, may enable the leading section to advance and drive off the resistance. Opportunities to move small groups by covered approaches are often available. Highly effective surprise fires may be delivered by these small groups, where the movement of a larger force would be quickly observed by the enemy.

(2) The platoon leader may maneuver his rear section off to one flank under cover or under the protection of the leading section's fire and then, combining fire and movement, cause the two sections to close with the enemy.

(3) The platoon leader may split the rear section and maneuver to both flanks. However, the small size of the platoon and the limited maneuver area, usually available,

make the double flanking effort generally out of the question.

(4) One other choice of methods remains available. The platoon leader may place sections in line. This method, though frequently the only one that can be put into effect, should not be adopted if any other choice is possible.

A caution must be entered here about advance on the battlefield. A steady pressure by advance of individuals and small groups over defiladed approaches will be usually more economical and more effective than advance by rushing, particularly in the case of light machine-gun elements. Rushing forward in elements of any size should be undertaken only when covered routes cannot be found or when the speed of advance will compensate for expected losses. Light machine guns should be maneuvered forward under cover to previously selected positions.

As soon as the platoon has overcome the hostile resistance it resumes the advance quickly so as to forestall hostile reorganization. If reorganization is necessary before the advance can be resumed, protective elements are thrown out to the front while the reorganization is being effected. If the situation temporarily prohibits the advance, the ground gained must not be abandoned. Even though contact with neighboring units has been lost, the small area held by the platoon constitutes a valuable supporting point from which enemy fires may be kept down and also may deprive the enemy of a keypoint.

During combat the platoon leader should make every effort to keep in touch with adjacent platoons and should be on the alert to assist them. The situation itself will determine the best method of assistance: in one case the platoon leader may find it best to fire across the neighbor's front against the resistance holding up this adjacent unit; in another to launch an attack against the resistance; and in still another to continue the advance of his own platoon in its assigned zone of action. It should be remembered that this latter method is usually the best way to assist the advance of a neighboring unit.

Although the platoon leader should strive to assist his neighbor's advance, he must not lose sight of the fact that the accomplishment of the battle task assigned his own platoon is his first concern. Any assistance to a neighbor is given primarily to assist his own advance on his objective or to further the scheme of maneuver of the company to which his platoon belongs.

THE RIFLE COMPANY

In considering the tactical principles of the rifle company in the attack we find that they do not differ from those of any "three unit" infantry organization. The fighting methods of the company are all variations of the *fix, attack* and *finish* method. Part of the force fixes the enemy by an attack; a second part attacks with the principal effort and a third, if necessary, attacks, to reinforce the more successful of the other two elements.

As in the platoon, the plans of the rifle company must be simple if they are to be successful.

In general, the plan of attack of the company commander is the method or scheme to be employed in the capture of that piece of terrain in the enemy's possession which will be the most valuable in furthering the battle task assigned the company by higher authority or deduced by the company commander from the situation. The selection of that piece of terrain is the first step; once that selection has been made, the development of the plan becomes the assignment of the means at hand to accomplish its capture.

The success of the company attack is the result of three factors: fire, movement, and the use of ground. If the company commander will always keep those three vital factors of combat before him, if he will continually ask himself whether or not he is making the best use of all three, then his decision will be based upon ordinary common sense and a reasonable amount of tactical knowledge.

Of these three great factors of combat, the one most frequently neglected is fire. By intelligent calls through his battalion commander for the fires of supporting weapons of his regiment, the company commander can greatly assist the attack of his company. He should not wait to relay the calls of his platoon commanders for fire support; he should anticipate them. His platoon leaders are usually so busy with the difficult task of commanding their fighting men that they have little time to think of anything but the limited and intense picture before their eyes. It cannot be too emphatically stated that in the attack the duty of calling for these supporting fires, when and where needed, belongs to the company commander, and this duty is second to none.

Once the attack is launched the advance of the assault echelons is mainly in the hands of the assault platoon commanders. TR 420-120 states—"During the fire fight the principal duties of the company commander are * * * " and then lists 15. Although the importance of none is minimized, a few of the more outstanding are:

(1) Keeping the attack going in the desired direction.

(2) Providing security.

(3) Keeping the higher command informed of the situation.

The first of these, i.e., keeping the attack going in the desired direction, gets at the very basis of all successful attacks. Not only must the attack be kept going, but it must be kept going in the proper direction. Maintenance of the direction of attack assigned his company is the responsibility of the company commander. The importance of this duty may be readily conceived when it is remembered that many attacks have failed from loss of direction.

Another duty of the company commander in the attack is to maintain contact with units on his flanks. This is in the interest both of cooperation and of security. This security provision should never be omitted in any type of military operation, but it is particularly vital in the attack. Even a small surprise attack delivered

against the attacker from an unexpected quarter will almost certainly break his formation.

The company commander must always provide security, including that to the front. Should contact with the enemy be broken, patrols must be immediately sent forward to renew and maintain contact. And last, but by no means least, he should keep higher authority informed of the situation. Company commanders forget this duty with surprising frequency—nor is this forgetfulness limited to the company grades.

SUMMARY

To summarize: Strike unexpectedly with the maximum force available at a single decisive point in a decisive direction; keep constantly before you the thought: FIRE, MOVEMENT, GROUND.

CHAPTER 6

Rifle Company and Platoon in the Attack

(MAP PROBLEM)

SITUATION AND FIRST REQUIREMENT

1. *SITUATION.—a.* Special Map No. 2, The Infantry School, 6 inches = 1 mile (See pocket in back of book).

b. The Blue 1st Infantry, an exterior regiment advancing toward the northwest, has gained contact with the enemy and is to attack with 1st and 2d Battalions abreast, 1st Battalion on the right, and drive the enemy to the northwest.

c. The enemy is in position along the general line: stream flowing northeast from road bend 529-L (342-744)—O. Grisham (342-743)—southeastern edge of woods 400 yards southwest of O. Grisham—P. Odle (341-742)—RJ 540-B (341-741) * * * . Our reconnaissance units have reached the line: the road: McCleary School (343-744)—RJ 480-B (341-741).

d. Following are extracts from the 1st Battalion commander's attack order issued near Clear Springs Stock Farm to Captain Company A, his first sergeant, two runners, and similiar groups from other companies, including Company D and the Mortar Company.

"You know the situation.

"Company D, initially in direct support, and the 1st Platoon Mortar Company attached, will support our battalion.

"This battalion attacks at 10:30 AM today with Com-

panies A and B abreast, Company B on the right, over the north flank of hill *722-b* (341-743) and the high ground north of RJ 705 (40-45) and drives the enemy to the northwest.

"Boundary between this battalion and the 2d Battalion: RJ 567-G (342-741)—CR 618-E (342-742)—hill *722-b* (341-743)—hill *747* (340-744).

"Line of departure: that road (pointing to the McCleary School—CR 618-E road).

"Company A, on a front of 300 yards, will attack through the woods on the west slope of hill *722-b* and continue its attack to the northwest. It will maintain contact with Company B on its right.

"Company B will attack under cover of the woods between Grisham and Floyd and continue its attack to the northwest.

"Company D from positions * * * will initially support the attack of Company B by fire on * * *.

"The 1st Platoon Mortar Company is attached to Company A.

"Company C will furnish a connecting group to maintain contact between Company A and the 2d Battalion.

"Are there any questions? It is now 9:35 AM. That is all."

e. Company A at this time is located in the woods just east of RJ 567-G (342-741), at which point it has just arrived. Extra ammunition is being issued.

FIRST REQUIREMENT

2. The actions and orders of Captain Company A from 9:35 AM up to the time he issues his order for the attack. (Omit all reference to administrative and supply details.)

NOTES

a. The company commander has the only map in his company.

b. All streams are easily fordable.

c. The company commander has had no opportunity to make any reconnaissance.

A SOLUTION OF FIRST REQUIREMENT

3. The actions and orders of Captain Company A, from 9:35 AM until he issues the orders for the attack of Company A, are as follows:

a. At 9:35 AM, he consults with Lieutenant 1st Platoon Mortar Company. He arranges for Lieutenant 1st Platoon Mortar Company to meet him later at the north edge of the woods 600 yards southwest of Clear Spring Stock Farm.

b. From 9:36 to 9:38 AM he studies his map and the terrain.

c. At 9:38 AM, he orders his first sergeant: "Return to the company and have the platoon leaders join me at the north edge of those woods (pointing to woods 600 yards southwest of Clear Spring Stock Farm) at once. Move the company under cover to a position in the woods at the head of this draw (pointing to draw southwest of Clear Spring Stock Farm). Inform the platoon sergeants of the situation."

d. At 9:39 AM, Captain Company A with two messengers moved up the draw mentioned to cover of the woods, thence through the woods to the north edge 600 yards southwest of Clear Spring Stock Farm, arriving there at 9:51 AM.

e. From 9:51 AM to 9:53 AM he studies his map and the terrain.

f. At 9:53 AM he leaves one messenger to meet the platoon leaders, then makes a reconnaissance under cover of the woods, returning in time to meet Lieutenant 1st Platoon Mortar Company and his own platoon leaders who arrive at 10:06 AM.

g. From 10:06 AM until 10:09 AM he consults with Lieutenant 1st Platoon Mortar Company relative to as-

sistance of the mortar platoon in the attack. He informs him of the scheme of maneuver of Company A, and requests that a corporal agent from his organization accompany him until Company A reaches the edge of woods to the front.

SECOND REQUIREMENT

4. The actions and orders as actually issued by Captain Company A (omitting any reference to administrative and supply matters) from 10:08 AM until 10:30 AM.

A SOLUTION OF SECOND REQUIREMENT

5. The actions taken and the orders as actually issued by Captain Company A from 10:08 AM until 10:30 AM are as follows:

a. From 10:08 until 10:10 AM Captain Company A, in the northern corner of the woods 400 yards southwest of Clear Spring Stock Farm, acquaints his platoon leaders with the situation and with the battalion commander's orders, pointing out on the terrain all terrain features to which there is any reference.

b. At 10:10 AM he issued the following oral order:

"You know the situation.

"The 1st Platoon Mortar Company attached, will initially support Company A by placing fire on the woods in our immediate front.

"This company will advance from this edge (pointing to northwestern edge) of these woods (woods where group is located) at 10:22 AM, cross that road (pointing to the RJ 530-F (342-743)—CR 618-E road) and capture the near—the eastern—edge of those woods (pointing to woods 900 yards to the northwest).

"Formation: 1st and 2d Platoons in assault, 2d Platoon on the right.

"The 1st Platoon will secure the edge of the woods

from the nose of the hill halfway to the creek, and maintain contact with the 2d Platoon on its right.

"The 2d Platoon will secure the edge of the woods from the creek halfway to the nose of the hill.

"The 3d Platoon will remain here initially.

"When the edge of those woods are secured (pointing to woods 900 yards to the northwest) platoons will reorganize prepared to continue the attack on my orders.

"I will be in rear of the 1st Platoon. Are there any questions? It is now 10:12 AM. That is all."

c. From 10:12 until 10:22 AM, Captain Company A observed the movement of his platoons into position for the attack, then moved to a position in rear of the right of the 1st Platoon.

6. *SITUATION, CONTINUED.*—The attack of Company A progressed slowly, the company receiving considerable rifle fire from the woods to its front and on its left. The unit of the 2d Battalion on the left, however, made rapid progress, and soon hostile fire against Company A on the left ceased. The 2d Platoon has started to advance up to its front. The 1st Platoon was still firing on the edge of the woods from the line of departure. At this time (10:40 AM) Captain Company A noted that hostile machine guns located in the woods near the center of Company A's front were firing across the draw and were apparently holding up the advance of Company B on our right.

THIRD REQUIREMENT

7. Actions of Captain Company A as of 10:40 AM.

A SOLUTION OF THIRD REQUIREMENT

8. The actions of Captain Company A as of 10:40 AM were as follows:

He notifies the 2d Platoon and the battalion commander

where the hostile machine guns are; directs the 1st Platoon to bring fire on these guns and directs, though the corporal agent, mortar fire on them and continues the attack.

9. *SITUATION, CONTINUED.*—At 11:10 AM, Company A was inside the edge of the woods 500 yards northwest of CR 618-E and the assault platoons were reorganizing to continue the attack. Hostile resistance in front of Company A had ceased. The 3d Platoon was halted in the draw 200 yards southwest of house at (342.1-743.3). Company B was abreast and reorganizing to continue the attack. The leaders of the 1st and 2d Platoons of Company A had joined Captain Company A. All are familiar with the situation.

FOURTH REQUIREMENT

10. The actions and orders as actually issued by Captain Company A (omitting administrative and supply details) from 11:10 AM until the attack was renewed.

A SOLUTION OF FOURTH REQUIREMENT

11*a*. At 11:10 AM, Captain Company A ordered: "The company will attack through this woods on my signal with platoons abreast and no change in direction. Assault platoons will halt inside the far edge of the woods until I order renewal of the advance. The 3d Platoon will follow the 2d Platoon at 50 yards. I will be in rear of the right of the 1st Platoon. Are there any questions? That is all."

b. At 11:12 AM, he sends a messenger to the 3d Platoon with this message: "Renewing attack; 3d Platoon move north up stream then follow 2d Platoon at 50 yards."

c. At 11:13 AM, he sends the following written message to the battalion commander: "Captured edge of

woods east of hill *722-b*. Am attacking through woods at once."

d. At 11:14 AM he directs the mortar platoon to displace forward to these woods.

e. At 11:15 AM Captain Company A signalled the attack to continue.

12. *SITUATION, CONTINUED.*—The advance through the woods proceeded with little opposition. At 11:34 AM the situation was as follows:

a. The company, with both assault platoons abreast was just inside the western edge of the woods east of hill *722-b* with its left near the boundary between battalions and its right at the head of the stream northeast of hill *722-b*. The 3d Platoon was in the stream bed 50 yards east of the 2d Platoon. Hostile machine guns on the west slope of hill *722-b* were holding up the advance of the 2d Battalion across the open ground to the south of the hill. Hostile machine guns in the woods just south of the road bend 350 yards west of R. Floyd were holding up the advance of Company B. The mortar platoon is displacing forward. The enemy has trenches on hill *722-b*.

b. Captain Company A at this time (11:34 AM) is at the western edge of the little clump of woods 100 yards northeast of b in *722-b*. With him are his platoon leaders and three messengers. All are acquainted with the situation.

FIFTH REQUIREMENT

13. The actions and the orders of Captain Company A from 11:34 AM until the company renews the attack (omitting all reference to administrative and supply details).

A SOLUTION OF FIFTH REQUIREMENT

14*a*. The actions and orders of Captain Company A from 11:34 AM until the company renews the attack are as follows:

b. At 11:34 AM he issues the following oral order:

"We will resume the attack at once. 1st Platoon will attack those woods (pointing to woods to northwest). The 2d Platoon will move up the draw and attack those woods (pointing to clump of woods 300 yards north of this point). The 3d Platoon in support from positions along the northern edge of this woods will fire on the enemy in the clump of woods 300 yards north of this point. The mortar platoon will fire on hostile machine guns to our right front. Messages to me here. Are there any questions? Move out."

c. At 11:36 AM he sends the following written message to the battalion commander:

"Have reached western edge of woods east of hill *722-b*. The 2d Battalion held up by machine-gun fire from hill *722-b* and Company B held up by machine-gun fire from woods 500 yards north of hill *722-b*. Am continuing the attack at once."

Captain Company A then remained in observation of the attack.

15. *SITUATION, CONTINUED.*—At 11:36 AM, Lieutenant 2d Platoon, who was accompanied by two messengers, had heard the order of Captain Company A.

SIXTH REQUIREMENT

16. The actions and the orders of Lieutenant 2d Platoon from 11:36 AM until his platoon attacked.

A SOLUTION OF SIXTH REQUIREMENT

17. The actions and orders of Lieutenant 2d Platoon from 11:36 AM until his platoon attacked are as follows:

a. At 11:36 AM Lieutenant 2d Platoon ordered a messenger: "Return to the platoon. Tell the platoon sergeant to have them ready to move north, 2d Section leading."

b. From 11:37 AM to 11:38 AM he observed the terrain, then rejoined his platoon at 11:40 AM.

c. At 11:40 AM, he called his platoon sergeant and section sergeants to him and, after briefly informing them of the situation, issued the following oral order:

"We attack at once and capture those woods (pointing to large clump of woods 300 yards to the north).

"Formation for attack, platoon column, 1st Section following 2d Section. Move under cover of those woods (pointing to strip of woods immediately in front). I will be at the head of the 2d Section. Are there any questions? Scouts out."

d. Lieutenant 2d Platoon then moved out ahead of the 2d Section behind its scouts.

CHAPTER 7

Infantry and Engineers

(INFANTRY SCHOOL TEACHING)

Modern warfare involves extensive engineering operations. The bulk of these operations are carried on in rear of the actual zone of combat and are of a highly technical character. However, a considerable amount of *rough, fast* engineer work devolves upon combat troops. The latter class of work may be divided into two general categories.

The first category is rough engineer work directly associated with infantry defensive combat and, therefore, performed by infantry soldiers. For example, the hasty organization of a defensive position involves the following tasks, all of which are performed by infantry troops:

(1) Excavation of earth to provide cover and concealment for personnel and weapons.

(2) Erection of barbed wire obstacles.

(3) Laying of antitank mine fields.

(4) Construction of miscellaneous installations such as command posts, observation posts, and aid stations.

(5) Camouflage of all of the foregoing by simple means with materials locally available.

For such work, the only assistance needed by the infantry from the engineers is the timely provision of adequate tools and materials.

The second category is engineer work of a more technical nature than the above and not directly associated with infantry combat. This type of work is carried on by engineer troops who are especially organized, trained,

and equipped for the purpose. These technical tasks comprise three general classes of work, namely:

(1) Repair, maintenance, and construction of routes of communication. This is by far the most important function of the engineers and usually occupies the bulk of their personnel, equipment, and time.

(2) Increasing the defensive powers of the infantry. This varies from the mere provision of tools and materials for the hasty organization of a defensive position, to the construction and supervision of more elaborate defensive works, the execution of demolitions and the erection of obstacles that would be undertaken in the more deliberate organization of a defensive position.

(3) Providing for water supply and shelter.

Experience has shown that the best results are obtained if engineering work is controlled by division headquarters. The division is the smallest unit of which engineers form an organic part. Parcelling out of engineer troops by attachment to lower echelons is to be deprecated. Such disposition usually results in confusion, overlapping, waste of effort, and lack of flexibility in the division commander's efforts to direct the engineers for the maximum benefit of the division as a whole. The same thing applies to the reinforced brigade acting independently.

Consequently, infantry commanders below the division will not often have engineer troops directly under their command. There are, however, exceptions. Infantry commanders of advance and rear guards, wide envelopments, or river crossing forces will have engineers, but their attachment must be justified by the situation. As a consequence, it is necessary that all infantry officers should have a knowledge of the capabilities of engineer troops and the manner in which their services can be utilized for the greatest benefit of the infantry.

In order to simplify the following problem, it may be said that the third function of the engineers, that of providing water supply and shelter, will not be considered. Under ordinary circumstances and on ordinary terrain this function will not play a large part in the work of

engineers attached to infantry units. On the other hand, the first two engineering functions are always of great importance to infantry in combat. It is on these matters that we will concentrate, as well as on the engineering work often required of infantry soldiers.

The problem that follows indicates the scope of the engineering work demanded of infantry and the proper use of engineers in various situations. Furthermore, it furnishes a convenient test that any officer can use to ascertain if he, as a staff officer or commander, has the correct conception of how to utilize the services of engineer troops in the most effective manner.

FIELD ENGINEERING

(Map Problem)

SITUATION.—a. Map: Part of U.S.G.S. Chambersburg Quadrangle, 1:62,500. (See Figure 13, which shows part of the Cumberland Valley. South Mountain parallels the right edge of the sketch; its lower slopes just entering the right side of the sketch. Mount Union, just off the map, is on the Chambersburg-Gettysburg Pike at the entrance of the pass over the mountain.)

b. A reinforced infantry brigade (Tables of Organization, Command and General Staff School, 1937, page 7)* has arrived at Waynesboro with the mission of moving north in the Cumberland Valley to protect the left of an army advancing northward on the east side of South Mountain. It has been decided to send the cavalry squadron a day's march ahead of the remainder of the brigade,

* This independent brigade would normally have the following units attached: one squadron of cavalry (reinforced), one observation squadron, one balloon squadron, one field artillery regiment (75-mm), one battalion medium artillery (155-mm howitzers), one battalion antiaircraft artillery, one antitank company, one battalion of engineers (reinforced), one chemical company, one tank company, one signal detachment, one provisional quartermaster battalion, one provisional medical battalion, one ordnance company, one military police company, ammunition train, one battalion line of communication troops (L. of C. troops).

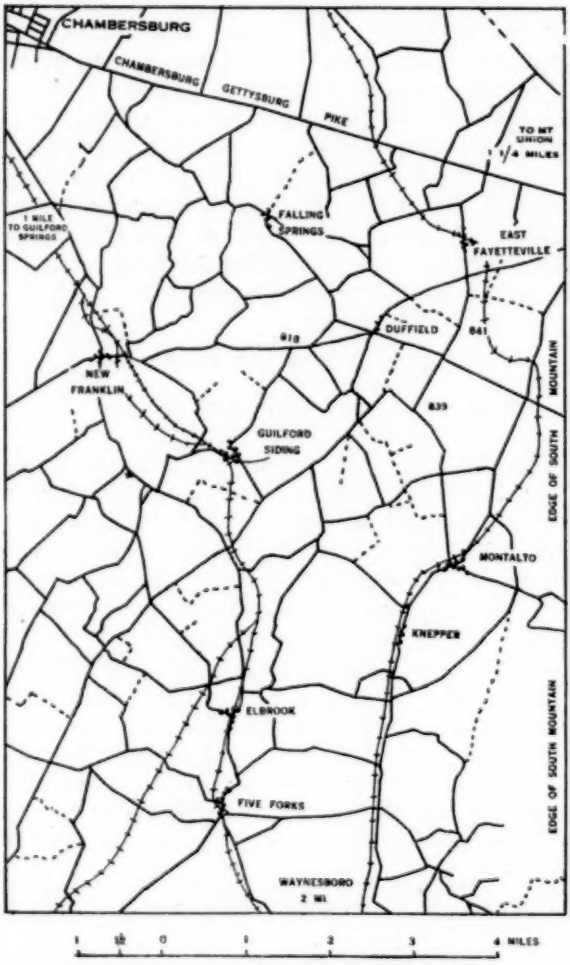

FIGURE 13.—Portion of the Cumberland Valley. (Taken from Chambersburg Quadrangle.)

on a reconnaissance and delaying mission. The following are three possible methods of disposing of the engineer troops, in so far as their possible use with the cavalry is concerned:

(1) Attach an engineer officer and three engineer noncommissioned officers to the squadron for engineer reconnaissance.

(2) Attach a platoon of engineers (motorized) to the cavalry squadron to initiate such work on routes of communication for the brigade as may be found necessary.

(3) Send no engineer personnel with the cavalry squadron.

FIRST REQUIREMENT

a. Indicate by a check mark above, the plan that in your opinion should be adopted.

b. State briefly, in the space below, the principal reason for your selection.

c. State briefly, in the space below, the principal reason that led you to discard each of the plans that you rejected.

A SOLUTION OF FIRST REQUIREMENT

a. The first plan should be adopted.

b. The principal reason for the selection of this plan is that the unit engineer with the brigade will receive early technical information of the engineering work that may be required of his battalion, and so save time in its accomplishment.

c. The principal objection to the second plan is that the presence of a motorized platoon of engineers would handicap the cavalry in the accomplishment of its mission, because of the protection required by the engineers while working.

The principal objection to the third plan is that it would leave the unit engineer of the brigade in the dark regarding the engineering situation at the front.

DISCUSSION

Time is the essence of all engineer work connected with military operations. A perfectly designed and erected bridge that is completed too late is an utter failure. One that may look like an absurd makeshift, that creaks and groans but carries the loads and is completed on time, is a success. Engineer troops can usually be made available on the site of any work without undue delay. But if they arrive on the site without adequate tools and materials and have to formulate plans for the work after their arrival, much time is unnecessarily lost. Therefore, one of the vital factors in expediting the completion of work is advance information regarding its character and extent.

However, the cavalry has no personnel trained to estimate quickly and accurately the wide range of engineering situations that may be encountered. With no engineer personnel present with the cavalry, the brigade commander would expect to receive information that a bridge was out or damaged or that a certain stretch of road was in bad shape; but if engineer personnel is with the cavalry, the unit engineer of the brigade, in the same situation, would expect to receive a sketch of the bridge showing the extent of the damage, the availability of local materials and any other details that might be essential to enable him to plan the work and start putting his plan into execution long before the site of the work was reached.

The absolute necessity for engineer personnel with the most advanced elements of any command is apparent. As to the number needed, a platoon would gather little more engineer information than a small detachment. The platoon would be an encumbrance to the cavalry,

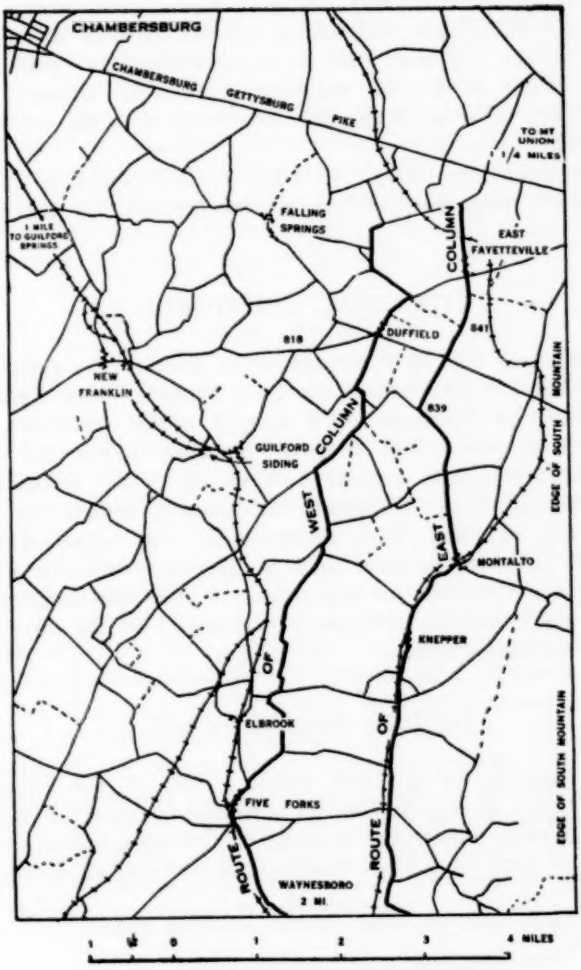

FIGURE 14.—Route of march.

which is largely independent of roads and bridges. The cavalry commander may not even know what routes the brigade will follow and hence will not be able to assign work to the engineer platoon. If he knows the route and finds work to do, he must take steps to protect the engineers while at work; this interferes with his primary mission.

The first plan listed, to send a small detachment of engineers with the cavalry, is therefore by far the best one.

SITUATION, CONTINUED

Time 6:00 AM 25 February.—The cavalry has reported no hostile troops south of the line: Duffield—New Franklin—Guilford Springs. (Off map 2 miles northwest of New Franklin.) The brigade marches north in two columns; the east column follows the road along the Cumberland Valley Railroad to Montalto, thence via RJ 839—RJ 841 and East Fayetteville; the west column follows the first parallel road to the west, through Five Forks and Duffield. An engineer unit of a size considered adaquate under the situation, is attached to the advance guard of each column.

SECOND REQUIREMENT

a. Indicate by a check mark which of the officers listed below is responsible for adequate engineering work being done to insure the passage of the main bodies over obstacles such as a weak bridge or a bad stretch of road.

(1) The unit engineer of the advance guard.

(2) The advance guard commander.

b. State briefly what you consider to be the responsibility of the officer other than the one you have checked.

A SOLUTION OF SECOND REQUIREMENT

a. The advance guard commander is responsible.

b. The unit engineer of the advance guard is responsible for advising the advance guard commander relative to engineer plans that are feasible to accomplish engineer work, and the amount of personnel, time, and materials each plan will require, and also for recommending the plan that he considers to be best. After the decision is made by the advance guard commander, the unit engineer is responsible for carrying out the work.

DISCUSSION

The advance guard commander carries full responsibility for insuring, up to the limit of the capabilities of the forces at his disposal, the uninterrupted advance of the main body. Two things can interfere with this advance: hostile fire and lack of adequate routes of communication. The advance guard commander is provided with means for overcoming either or both, and is held responsible for the proper use of these means. The unit engineer with the advance guard acts, as do all unit engineers, in a dual capacity. As a staff officer he furnishes information and recommendations to his commander; as commander of the engineer unit, he carries out the necessary work after the commander has made his decision. From the standpoint of command and staff relations, the unit engineer does not differ from the machine-gun unit commander or the artillery commander, or the tank commander if tanks are attached. Command of any unit involves complete responsibility for the coordinated use of all the elements of the command.

SITUATION, CONTINUED

To guard the left flank of the brigade against the possible menace of hostile armored cars, the left column

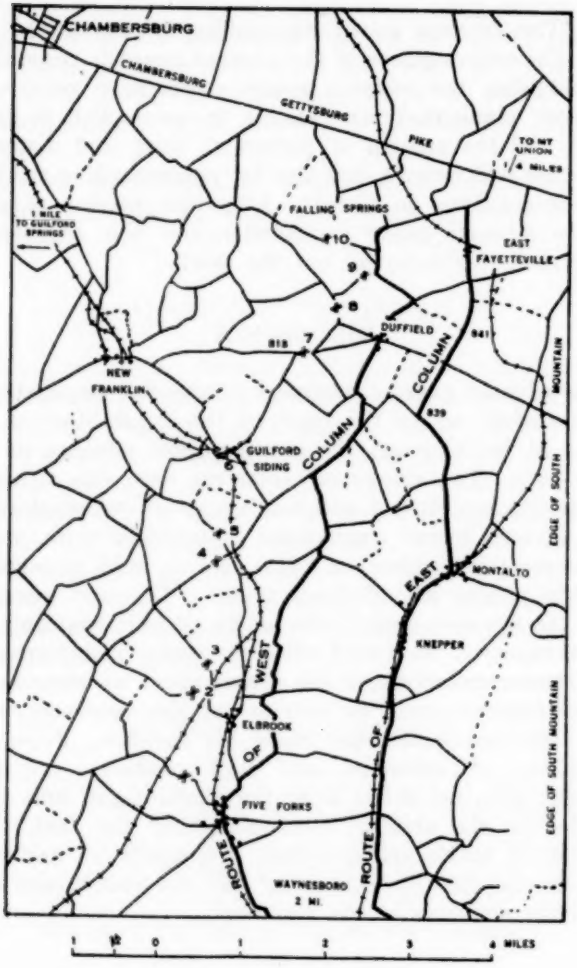

FIGURE 15.—Route of advance, showing road blocks.

commander decides to establish road blocks at the points indicated on Figure 15 by the symbol #, numbered 1 to 10, inclusive.

The country is fairly open, without large trees. Many stretches of road have side ditches too wide and deep to be crossed by wheeled motor vehicles. It is therefore decided to use land mines and firepower for the road blocks. Only the roads shown in full line are passable for armored cars.

THIRD REQUIREMENT

a. The ten road blocks shown do not prevent hostile access to the left column over all full line roads south of Block No. 10, inclusive. State how such access can be completely blocked.

b. Can the number of road blocks be reduced without neglecting to block all access by full line roads? If so, how?

c. Indicate by check mark which of the three general plans outlined below would be the best to follow in this situation:

(1) Assign this mission to an engineer unit (motorized) of size sufficient to install the land mines and furnish the firepower to prevent their removal.

(2) Assign this mission to an infantry unit large enough to furnish the firepower and attach to it sufficient engineer troops to provide a small engineer detachment at each road block; land mines to be furnished by the engineers.

(3) Assign this mission to an infantry unit of adequate size, provide a supply of land mines, and attach a small engineer detachment for general assistance.

d. State briefly the principal reasons for your choice of plan.

A SOLUTION OF THIRD REQUIREMENT

a. Access to the left column over full line roads can be completely blocked by shifting Block No. 7 to a point west of RJ 818.

b. Yes. Blocks Nos. 8 and 9 can be replaced by a single road block a short distance west of the road junction between No. 8 and No. 9.

c. The third plan is the best; namely, to assign this mission to an infantry unit, provide it with mines and attach a small engineer detachment for general assistance.

d. The primary mission is one of security; the technical work involved is neither extensive nor intricate. The mission is therefore primarily one for infantry, with a small engineer detachment to handle any special conditions that may be found.

DISCUSSION

Since there is no way of predicting which road or roads the hostile armored cars may use, all of the roads must be blocked. An examination of the road net will show that armored cars may evade Block No. 7 by turning southward before reaching it. Moving the block a short distance to the westward, beyond the road junction, will block this means of access.

The number of road blocks should be confined to the minimum required to accomplish the mission. The blocking of two forks of a road when a single block beyond the road junction will accomplish the purpose, is a waste of effort, unless physical conditions require it. In this situation it is apparent that a single block can replace the two at No. 8 and No. 9. Other reductions are possible, such as the replacement of No. 2 and No. 3, and No. 4 and No. 5, by single blocks at the crossroads to the eastward, providing local conditions make this practicable.

Engineer troops are trained and equipped to perform engineering tasks beyond the capicity of the other arms;

they should therefore be conserved for such tasks. The mere fact that the engineers furnish the land mines does not mean that they must be installed by engineers. The use of the latter to provide firepower at each road block would be a misuse of engineers. Such a mission is primarily one for infantry to perform. However, in this situation it is believed that a small engineer detachment might be needed. The main point to be illustrated is that engineer troops should not be frittered away upon tasks that involve merely a secondary technical phase of work which is entirely within the capabilities of the infantry.

SITUATION, CONTINUED

Time: 2:00 PM 25 February.—(See Figure 16, which is taken from the Chambersburg Quadrangle, with the omission of some details.) The cavalry has encountered a hostile force and has been driven back to a line generally east and west through Falling Springs. The hostile force, which is inferior to our brigade, is hastily organizing a defensive position as shown in Figure 16. Hostile artillery can fire as far east as Mt. Union. The brigade commander has been advised that the remainder of the division will arrive at Mt. Union via the Chambersburg-Gettysburg Pike about 5:00 PM tomorrow, 26 February. The brigade commander decides to attack at dawn tomorrow, enveloping the hostile right, drive the enemy to the north, and cover the debouchment of the remainder of the division into the Cumberland Valley from the pass at Mt. Union.

Figure 16 shows the general front line of the enemy position. It also indicates the line of departure and the boundary between regiments for the brigade attack. Brigade distributing points for infantry and artillery ammunition are shown in the vicinity of Guilford Siding, and the brigade collecting station is shown about a mile northeastward from New Franklin. Field trains

are to bivouac in the vicinity of Elbrook and Knepper. The railhead, refilling points, hospital station, and service trains are to be in the vicinity of Waynesboro. The main supply road is the road following the general line of the railroad from Waynesboro to Guilford Siding.

FOURTH REQUIREMENT

a. Consider the use of the road net by the various elements of the brigade in connection with the attack. Indicated below by arms and services are the major components of the brigade (reinforced). Indicate by a check mark which of them will use the road net in connection with the attack and will therefore be interested in its repair and maintenance:

Infantry	Field Artillery	Cavalry
Coast Artillery	Engineers	Chemical Warfare
Tanks	Signal	Ordnance
Quartermaster	Medical	L of C Troops

b. Indicate by a check mark which of the following plans you consider best for repairing and maintaining the road net:

(1) Attach adequate units of engineer troops to each of the infantry regiments and the line of communication troops; hold the commanders of these units responsible for the engineer work in their respective zones of operation; have other commanders make their engineer requirements known to one or the other of the three responsible commanders mentioned above.

(2) Attach engineer units to each regiment of infantry and to the artillery and hold them responsible for road maintenance; maintain the main supply road under brigade control.

(3) Divide the brigade zone of action and the rear installations into definite areas and assign engineer units to perform all necessary engineer work in each area,

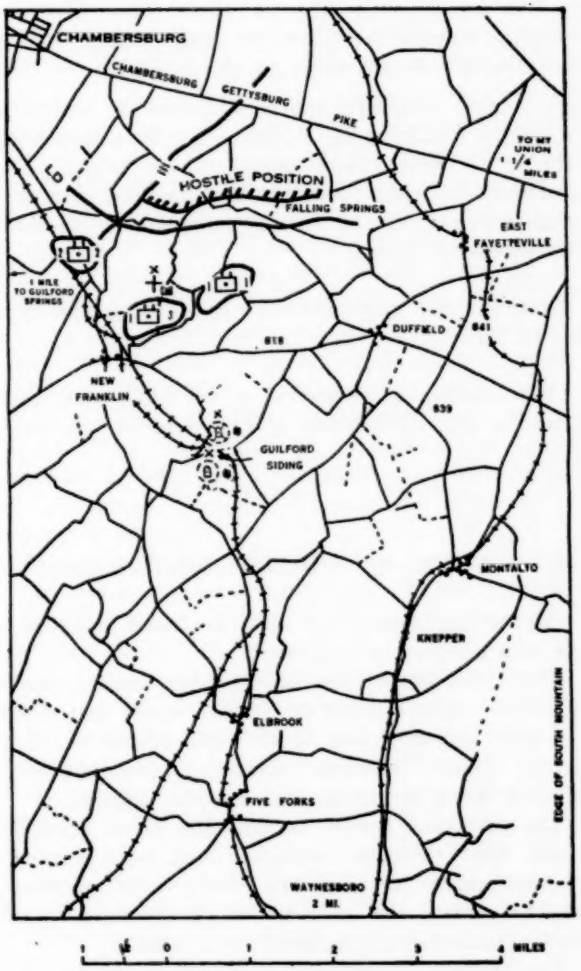

FIGURE 16.—Enemy defensive position.

under brigade control; have the engineers maintain liaison with the units operating in their respective areas; decisions involving coordination and priority of work, when necessary, to be made by the brigade.

(4) Assign adequate engineer troops to maintain the main supply road, under brigade control; assemble the remainder of the engineer troops, under brigade control, in a central position forward, to which all requests for engineer services will be sent by subordinate commanders as the necessity arises.

c. State briefly the principal reasons governing your choice of plan.

d. Who makes the decision as to what plan shall be adopted for the disposition and control of the engineer troops?

A SOLUTION OF FOURTH REQUIREMENT

a. All of the arms and services listed use the road net for one purpose or another.

b. The third plan listed is the best; namely, to have the engineer units operate in definite areas and maintain liaison with infantry and other units operating in their respective areas; matters involving coordination and priority of work to be decided by the brigade.

c. The principal reason is that the third plan is the only one that provides adequate engineer service for local commanders and at the same time enables the brigade to control the engineer work in order to secure the best results for the brigade as a whole.

d. The brigade commander makes the decision regarding the plan for the disposition and control of the engineer troops.

DISCUSSION

Without going into the details of the attack, either tactical or logistical, it is apparent at a glance that every major component of the brigade will make use of the road net for one purpose or another. And it is further apparent that many of the roads will be used by all of the components. With the exception of cross-country routes, there is hardly any road in the net that will not be used by more than one of the components.

The fact that so many subordinate elements of the brigade make use of the road net is the basic reason for controlling its maintenance by the brigade rather than dividing the job and assigning parts of it to different subordinate commanders. The latter plan involves confusion as to responsibility, overlapping and consequent waste of effort, and lack of flexibility; i.e., power to concentrate the effort of the engineer troops, when necessary, upon work that will further the interests of the brigade as a whole.

Attachment is justified only when a subordinate element is given a mission involving engineer work sufficiently separated from that of the whole force to avoid overlapping of effort. Advance and rear guards are examples that are typical. If, in the attack we are considering, the left regiment were to make a wide envelopment, it would be desirable to place upon its commander direct responsibility for the accomplishment of the necessary engineering work; this, necessarily, involves the attachment of an adequate engineer unit.

The foregoing considerations eliminate the first two plans listed, since both of them involve attachment of engineers to subordinate units. The fourth plan listed, which provides for assembling the bulk of the engineers in a forward position from which they may be sent to perform various tasks as required, is objectionable because it involves waiting until *repair* of roads is needed before sending out engineers. It is much easier to *maintain* roads—that is, to prevent their failure—than

it is to *repair* them after they have failed. The bulk of the engineers should, therefore, be distributed over the zone of action from the outset, so that they can observe the roads, anticipate the need of maintenance work, and take timely steps to effect it. This is provided only in the third plan, which is the one normally followed in the disposition of engineers for an attack.

SITUATION, CONTINUED

Time: 2:00 PM 26 February.—The attack has succeeded in decisively defeating the hostile force, which has initiated a daylight withdrawal. The brigade commander, after considering the possibility of hostile reinforcement and in view of the arrival of the remainder of his division beginning at 5:00 PM, decides to send a motorized column through Chambersburg, thence northeastward to cut off the hostile retreat. A battalion of infantry (less one rifle company), with one heavy machine-gun company (less one platoon), and a battery of artillery (truck-drawn) have been decided upon as components of the pursuing column.

Rain has been falling for several hours, cross-country traffic is becoming increasingly difficult, and shoulders have softened on many of the two-track roads, reducing them to one-track roads. The engineers, by their utmost efforts, have barely been able to keep open sufficient routes of communication to avoid slowing down the attack. Any cessation of their efforts will probably result in serious delay in the delivery of food and other supplies during the coming night.

FIFTH REQUIREMENT

a. Indicate by a check mark which of the following plans for the employment of the engineers you consider best.

(1) Attach to the pursuing column an adequate engineer unit now working in the forward area; redistribute the remaining engineer troops in the forward area, regardless of the probable delay that will ensure in the supply of the main force.

(2) Keep the forward engineer troops on their present tasks, warning one unit to be prepared to assemble on short notice to follow the pursuing column; instruct the commander of the pursuing column to report any need for engineer troops that may arise during the course of the pursuit; decide as to the priority of engineer work after receipt of information from the pursuing force.

(3) Abandon maintenance of the main supply road from Waynesboro; rely upon the divsion, soon to arrive, for the maintenance of this or another main supply road; assemble the engineers working on the main supply road and have them follow the pursuing column as soon as they become available.

b. State briefly the principal reasons for your choice.

A SOLUTION OF FIFTH REQUIREMENT

a. The first plan is the best; namely, to attach engineers to the pursuing force and redistribute the engineers work, regardless of the probable effect upon the supply of the main force.

b. (1) Exploitation of victory to the utmost takes precedence over any other immediate mission.

(2) The pursuing column may reasonably expect to encounter obstacles to movement.

(3) Engineers will facilitate the movement of the column.

(4) When the column reaches the enemy rear, engineers can execute demolitions and erect obstacles to impede his retreat.

DISCUSSION

During combat, questions of priority of engineer tasks frequently arise. Few of them are as simple as the one shown in this situation, which demands the exploitation of the victory gained by the attack. The enemy will expect pursuit by parallel roads on the flank, as well as the continuation of direct pressure; he will use his best efforts to impede the pursuit in every possible way. Not only can the need for engineers with the pursuing column be foreseen, but the assistance they can give by demolitions and obstacles when the pursuit reaches the hostile rear, is apparent. The first plan is therefore the best one to follow.

Either of the other two plans mentioned involves the risk of serious delay to the pursuing force. The immediate effect of delay in the movement of the pursuing force is vastly more serious than a delay in the supply of the main force.

As a minor factor, the engineers may be able to add to the firepower of the pursuing column.

SITUATION, CONTINUED

Time: 10:00 AM 27 February.—The pursuit succeeded in partly blocking the enemy withdrawal; many prisoners, weapons, and vehicles were captured; the remainder of the hostile force was driven off to the north. The division commander arrived late in the afternoon, 26 February, and learning that a larger force of the enemy was moving down from the north, directed the organization of a defensive position to protect the exit of the pass at Mt. Union.

The details of the organization are omitted. Figure 17 is a diagrammatic representation of the sector of the left (1st) battalion of one of the interior regiments. It is now 10:00 AM. Reconnaissance has been completed; coordination between the rifle companies and the heavy

machine-gun company, as well as cooperation with neighboring battalions, has been effected; engineer tools have been delivered; men are moving into position and the delivery of barbed wire and pickets will begin shortly.

The regimental commander desires that the initial phase of the organization include the following:

Foxholes of the standing type for riflemen and light machine gunners along the front of each of the forward

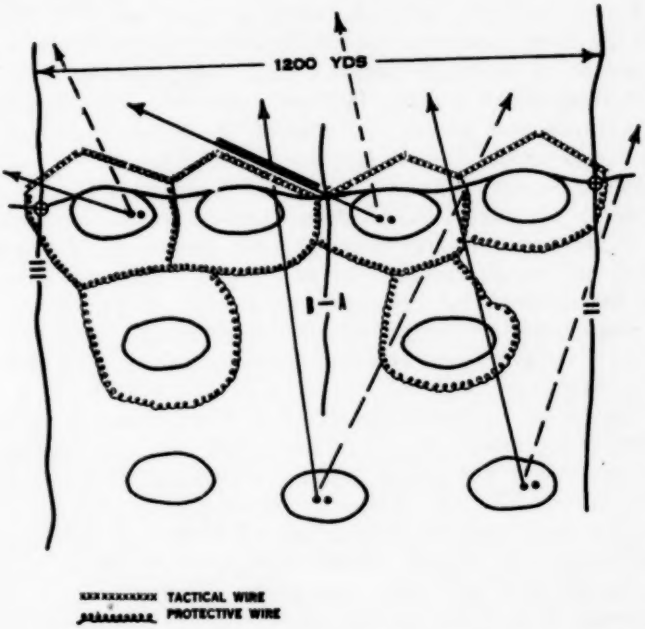

FIGURE 17.—Diagrammatic representation of a battalion sector.

and support combat groups of the position and an equal number along their flanks and rear to provide for redistribution of firepower; shallow connecting trenches.

Tactical wire across the entire front of the battalion.

All combat groups along the MLR and in support thereof to be completely surrounded with protective wire.

All heavy machine guns to have three emplacements of the open standing type.

Fields of fire for rifles and light machine guns (B.A.R.) fully cleared for a distance of 100 yards from the MLR; necessary lanes to be cleared for the heavy machine guns.

The battalion S-3 is making an estimate of the time required to complete the work. He has the following information and data:

The platoons organizing the combat groups average 42 men available for work. Each of these men will have to dig two foxholes of about 20 cubic feet each and an average of about 10 yards of shallow connecting trench requiring about 2 cubic feet per running foot of trench.

Tactical wire across the front of the battalion amounts to 1,500 yards of double-apron fence. Barbed wire and pickets can be delivered along the line by trucks at a number of points; the average hand-carry will be about 300 yards. A 10-man wiring party can erect 50 yards of double-apron fence in 30 minutes; 16 men can carry all the material for a 50-yard belt of wire; they can make a round trip in 30 minutes if the carry is 800 yards (The size of the carrying party can be reduced in proportion to the carry.)

Protective wire (4-strand fence) will amount to 3,000 yards to complete the encirclement of the four combat groups along the MLR and an additional 1,500 yards will encircle the two support combat groups. An 8-man wiring party can erect this type of wire at the rate of 50 yards in 15 minutes; 8 men can carry all the material for a 50-yard belt; they can make a round trip in 15 minutes if the carry is 400 yards. (In this situation the average carry is about 300 yards, which will allow a smaller carrying party.)

Clearing along the main line of resistance amounts to about 50,000 square yards; only light clearing is required; it can be done at the rate of 200 square yards per man per hour.

Emplacements of the open standing type for the heavy machine guns require 130 cubic feet of excavation each.

Three emplacements, a primary, alternate and supplementary, are required for each gun. Five men of each machine-gun squad require foxholes in the vicinity of each of the three gun emplacements. Six men of each machine-gun squad are available for work.

The ground is soft. It may be expected that excavation can be carried on at the following rate, in daylight:

Cubic feet excavated per man

1 hr	2 hr	3 hr	4 hr	5 hr	6 hr	7 hr	8 hr
30	50	66	80	94	108	121	133

All of the rates of work given above, for excavation, erection of wire and clearing, are for daylight, under normal conditions. Any work done after darkness will require 50% more time than if done during daylight. The rates included a reasonable time for shifting men on tasks.

Thirty minutes will suffice for the noon and evening meals.

Excavation interrupted by a meal or a change of task, proceeds thereafter at the rate the men were working when they stopped, not at the rate for the first hour.

Material assistance to the rifle companies in their work may not be expected from the machine-gun company.

Darkness falls at 6:00 PM.

SIXTH REQUIREMENT

a. What is S-3's estimate of the hour at which the rifle platoons in the four forward combat groups will complete their work (including excavation, clearing, tactical wire, protective wire surrounding each group) if the work is done by the personnel of these four platoons only?

b. If two additional platoons are made available to aid on the main line of resistance, for how long will their aid be required in order to insure that the work along that line is completed by dark?

c. At what hour will the heavy machine-gun company complete its emplacements and foxholes?
(Show calculations for all three estimates.)

A SOLUTION OF SIXTH REQUIREMENT

a. S-3 estimates the time required as follows:

Foxholes, 2 at 20 cu ft ..... 40 cu ft
Connecting trenches, 30 ft @ 2 cu ft ..... 60 cu ft
Total excavation per man ..... 100 cu ft
Time required, from table ..... 5 hr 30 min

Tactical wire, 1,500 yards
168 men available. Each team needs 10 men for wiring party and 6 for carrying 300 yards, total 16; 10 teams available; at 50 yds in ½ hr or 100 yds per hr, 10 teams can erect 1,000 yards per hour.
Time required ..... 1 hr 30 min

Protective wire, 3,000 yards
168 men available. Each team needs 8 men for wiring party and 6 men for carrying party, 300 yards, total 14 men; 12 teams available, at 50 yds in 15 min, or 200 yds per hour, can erect 2,400 yds per hour.
Time required ..... 1 hr 15 min

Clearing, 50,000 sq yds at 200 sq yds per man per hour requires 250 man-hours.
168 men available can complete it in ..... 1 hr 30 min
Time required, daylight work ..... 9 hr 45 min

Daylight available, 8 hours less 30 minutes for one meal, or 7 hr 30 min; this leaves 2 hrs 15 min work to be done at night,

which will require 50% additional time,
or 1 hr :08 min. Add to daylight time.....1 hr :08 min
Add time for two meals ..... 1 hr 00 min
Total elapsed time before work
is complete .....11 hr 53 min,
or 12 hr.

As it is now 10:00 AM, the work will be completed at 10:00 PM.

b. Four platoons have work to do that will require 9 hrs 45 min of daylight time. They have 7 hrs 30 min of daylight time to devote to it. They must therefore be relieved of work that would require 2 hrs 15 min in daylight and if only two platoons are to do it, they will need twice this time, or 4 hrs 30 min.

c. Each machine-gun squad has to excavate:

3 emplacements, at 130 cu ft	390 cu ft
15 foxholes at 20 cu ft	300 cu ft
Total excavation	690 cu ft

As six men are available for work, each must excavate 115 cubic feet, which will require about 6½ hours. Add half an hour for a meal and the elapsed time is 7 hours, which means that the machine-gun company excavation will be completed at 5:00 PM.

DISCUSSION

The principal point illustrated by this requirement is that a time estimate does not have to go into the details of the order in which the various tasks are accomplished nor the distribution of the men upon them. If the organization of the work is such that all of the men are kept constantly busy at effective work, it makes no difference in the time required for the completion whether all the available men are concentrated upon one task at a time or whether they work by companies or platoons upon different tasks simultaneously. Nor does the order in which the tasks are performed affect the

time of completion. In hasty organization it is desirable that a proper balance be maintained, so that if the work is stopped at any time, the tasks accomplished up to that time will be those most useful to the defense. The proper distribution of riflemen and light machine gunners on the ground, the clearing of fields of fire and the emplacement of the heavy machine guns are of primary importance. Tactical wire across the front follows, then protective wire surrounding the combat groups.

Any of the tasks connected with the organization of the ground can be carried on at night. All of them, however, must at least be laid out and started during daylight. Excavation can be carried on at night, but the sites for foxholes and machine-gun emplacements must be selected during daylight. Wire can be erected at night, but the location of the various belts must be determined and staked during the day.

In the problem presented, it is apparent that the four forward combat groups must be relieved of some of their work in order to achieve a more equitable division of labor in the battalion. The manner in which it would be done would depend upon the situation. In some cases it might be desirable to send aid from the regimental or the brigade reserve in order to lighten the burden of the front line troops.

As the machine-gun company finishes its excavation an hour ahead of the rifle companies, they could furnish about 50 men for an hour's work before dark. In general, however, under our present organization, it cannot be expected that the machine-gun company will be able to furnish material assistance in the rapid organization of the ground for defense.

CHAPTER 8

Infantry Around the World

(INFANTRY SCHOOL STUDY)

In this chapter there are numerous items of interest to any infantryman. The ideas spread before the reader may or may not conform to standard teachings in our army, but, as a whole, they give a good understanding of the opinions floating about in the military world today—opinions, some of which may one day crystallize into doctrines. The chapter has been compiled with the idea of stimulating thought and discussion. In no sense should it be looked upon as an authoritative Infantry School interpretation of current events.

VARIOUS VIEWS ON FIGHTING IN SPAIN

The "little" civil war in Spain, which was looked down upon as a third-rate affair by many military critics during the early months of strife, has developed to formidable proportions during the past year or so. Though at first there were but a meager 60,000-odd Nationalists opposing some 100,000-odd hastily recruited and unorganized Loyalists, the figures soon doubled, then tripled, and in the spring of 1938, it was estimated that more than a half-million men were in action on each side of the line that zigzags across the Spanish peninsula to divide Rightist from Leftist territory. From an initial strength of no more than 200 obsolescent airplanes in both camps, the air forces operating over Spain have grown to upwards of a thousand planes of up-to-date construction—probably two-thirds of

them bearing General Franco's colors. The third-class war has become first-class in importance, with the result that observers and critics are now watching it closely and drawing many sound conclusions from what they see.

What several critics have to say of this war and its lessons is told in this chapter. Their deductions throw considerable light on current military trends abroad, and indicate a few changes which may be made in the organization, arms, and tactical methods of European armies. In addition, from the remarks of observers and commentators it may be possible to discern the trend of future changes. However, one should not jump to the conclusion that because one or several foreign critics reach tentative or even definite decisions, that European powers will rush post haste to make changes to conform to these judgments. The matter is not as simple as that. Nations defer judgment until the last scrap of evidence is in and has been carefully scrutinized. As we read we should do the same.

DIVERSE OPINIONS ON TANKS IN SPAIN

Major General Fuller, British Army, retired, writing in the London *Times*, warns against the articles of over-zealous war correspondents:

It is quite wrong to judge these operations by World War standards. Neither side has large organized motorized or armored units. Light tanks (Italian 3-ton and German 6-ton) are reported to have proved almost worthless due to their weak armor and armament. They are not a combat vehicle, but rather a means of reconnaissance, and under favorable conditions will give their best results as such. Even medium tanks (Loyalist Russian-built) have failed, but it should be emphasized that no proper tank tactics were used.

This comment by General Fuller applies to operations during the first year of the war. Recent events on the Aragon front indicate that Nationalist tanks have been employed very profitably, particularly in exploitation and pursuit.

General Culmann reports in *La France Militaire* that the Nationalists employed 200 tanks in the abortive Guadalajara offensive of March, 1937; that their success could not be exploited as the infantry and artillery could not follow quickly enough.

From what can be gathered through all sources, his figure of 200 tanks appears to be an exaggeration; moreover, in that operation, the torrential rains and resulting mud handicapped Nationalist tank movements no less than artillery and motorized infantry movements. Guadalajara may become a by-word for mechanized and motorized units, signifying that bad weather means bad business. The Guadalajara offensive showed that the general staff of a modern army must perforce have a keen weather eye. Perhaps there should be a G-13 charged with mapping weather conditions.

General Culmann gives the following data on the tanks used in Spain:

Nationalist—

(1) Light tank, 6.6 tons, 0.6-inch armor, 2 MG's, 2-man crew, 30 mph.

(2) Tankette, Fiat-Ansaldo, 2-3 tons, 0.4-inch armor, 1-2 MG's, 2-man crew, 28 mph.

Loyalists—

(1) Light tank T-26 (Russian), 9.4 tons, 0.5-inch armor, one 37-mm or 47-mm cannon and 1-2 MG's, 3-man crew, 20 mph.

(2) Medium tank T-28 (Russian), 20 (18?) tons, 1-inch armor, one 47-mm cannon and 3 MG's, 5-6-man crew, 25 mph; similar to British 18-ton Vickers Armstrong tank, but defective and catches fire easily.

In the London *Times*, Captain Liddell Hart states that the only successful attack was made by 200 tanks supporting 5 weak Nationalist divisions. Large numbers, it would appear, must be employed if tanks are to be successful.

The magazine of German armored units, *Die Kraftfahrkampftruppe*, editorializes: "Without going into the ar-

mored materiel from a critical standpoint it must be said with respect to the tactical value of the light tank, that it can only be successful when properly employed in large numbers and by surprise. If, however, as seems to have been the case, these tanks are employed alone or in small numbers along roads it is not surprising that they were so often defeated. It is incorrect, therefore, to draw the conclusion that light tanks are of no value."

General Niessel, in *Revue Militaire Generale*, January, 1937, discusses the battle of Brunete, which the Loyalists launched July 6, 1937, with a surprise night attack on the temporarily depleted Nationalist lines west of Madrid. In the three weeks of fighting that ensued the Loyalist gains of the first week were more than half wiped out by the Nationalist counter-offensive of the last week. Tanks were frequently used in local operations but achieved no important results because they were not closely followed by the assaulting infantry, and also because they suffered heavy losses from hostile antitank guns and incendiary measures.

In the *Bulletin Belge des Sciences Militaires* for January, 1938, Major Wanty reports that 10 out of 60 Loyalist tanks which attacked one locality near Brunete were disabled by two antitank guns—probably German-made Rheinmetall 37-mm cannon.

Major Wanty enumerates various engagements in which tanks were employed up to the end of July, 1937, and sums up with these words: "One fact stands out among all these examples: nowhere did the tanks exercise a decisive influence on events, either because their initial success was not exploited by the infantry, or because they suffered excessive losses."

He concludes that several definite points have been demonstrated:

(1) The tank has no power to occupy terrain—a fact already known.

(2) It is of no value except as used with infantry which

follows in its traces, protecting it and exploiting its success.

(3) When not followed by infantry, it is extremely exposed to destruction or capture. *

(4) The tank in combat cannot exploit its speed, owing to the terrain obstacles over which it is obliged to move slowly, and to the need of frequent halts for locating and engaging hostile resistances. This item is less important for tanks of great stability and capacity for crossing obstacles—that is, the larger tanks.

Emilio Canevari, Lieutenant Colonel, Infantry Reserve Italian Army, who has made a study of the Spanish operations, which will be considered later, has this to say about tanks:

Except for a few instances, the small numbers of tanks used in Spain have accomplished very little, and in most cases have failed. The efficiency of the light tanks (such as the 3 to 4-ton Italian and 6-ton German machines) has been nil unless they are acting as flamethrowers (or reconnaissance vehicles). Because of their instability their machine guns fire blindly—most of the time into the air or the ground. The heavier tanks (like the Russian 8-ton and 18-ton), which are armed with a cannon, prove of some use. When tanks meet tanks, the heavier invariably vanquishes the lighter. The experience in Spain indicates that the tank is incapable of preceding the infantry and overwhelming the enemy. "Unless they are *preceded* (editor's italics) and continuously assisted by a reliable infantry they appear to have no effect whatever and soon meet with destruction.

"From this, therefore, it is reasonable to deduce that the rational employment of tanks in masses is in pursuit after a victory has been gained. . . . It is quite possible, however, that experience may prove that even this function can be rather better and more efficiently fulfilled by attack aviation."

*Out of 45 Loyalist tanks which attacked at Fuentes de Ebro in October, 1937, 22 were captured intact by the Nationalists after the tanks had been stopped by the barricades and obstacles at the edge of the town.

Hence the idea of employing tanks as a means of overcoming passive defenses and opening a way for infantry in attack seems to have failed. Also a failure is the idea of neutralizing with tank fire the enemy centers of resistance.

On the other hand, the heavy Russian tank (in reality a medium, weighing 18 tons)—while almost useless in its present form, owing to defects of construction and to incorrect methods of employment—represents an idea which might be developed. This machine really amounts to a quick-firing gun (it carries a 75-mm gun), equipped with a large reserve of ammunition, protected by armor, and capable of self-movement. Used as an armored accompanying gun, this machine, if better constructed and used behind a strong infantry, could render greater service than the customary unprotected gun that is moved by man power and inadequately equipped with ammunition.

From all the foregoing one may be able to discern a trend in tank development and use, but, by and large, it appears wise to await more definite data and a clarification of the data we have before coming to a definite decision regarding tanks.

INFANTRY IN THE WAR IN SPAIN *

Views of an Italian Officer

"The infantry remains the center of gravity of all armies, and to its action all the other arms must be subordinated."

INFANTRY

The ever-increasing complexity of warfare makes the employment of strongly led and highly trained troops absolutely imperative. Only such troops possess the ability to take the offensive and to maneuver. Hastily constituted

* Abstracts from "Forecasts from the War in Spain", by Emilio Canevari, Lieutenant Colonel, Infantry Reserve, Italian Army; *Army Ordnance*, March-April, 1938.

levies may be able to defend in trenches or behind walls, but the offensive or maneuvering (luring) defensive demands troops of high standard and a strongly developed military spirit. Enthusiasm alone is not sufficient to maneuver and to win.

Moreover, to be capable of maneuvering on the battlefield, troops must be led by competent higher officers and trained company commanders, capable of coping with the tactical problems which will confront them. An army also must have—and this has been clearly proved by the Spanish civil war—experienced junior officers and noncommissioned officers commanding platoons and squads, as well as long-service specialists.

To dispose of a solid infantry, there should be a noncommissioned officer or long-service specialist for every three privates. Only with such a backbone and with adequate periodical training, in the field, can units be constructed which are capable of surviving and advancing under the extremely difficult conditions imposed by a modern combat.

The World War confirmed the fact that the infantry needs powerful and ample armament. As for the arms themselves, the facts ascertained about them can be presented as follows:

There is a marked tendency to look for a submachine gun to be substituted for the rifle. In the ranks of the Spanish Nationalists, the German Schmeisser submachine gun of 9-mm caliber (0.354 inch) and 30-round magazine capacity is most in demand.

Another need of the infantry is a generous supply of reliable hand grenades.

The infantryman armed with an automatic rifle and hand grenades will always be the main element of the struggle. Therefore one should not diminish his number and still less hamper him by collective arms such as light machine guns. While attacking, some detachments on both sides in Spain have adopted with excellent results the system of the team or group of three infantrymen used by shock troops during the World War.

The light machine guns or machine rifles employed have

shown themselves badly adapted to those uses for which they originally were intended—to accompany the attack. They are defensive arms of poor efficiency which actually serve to retard the infantry.* Some models moreover have been impractical owing to the need for more perfect lubrication than is possible in the field. The heavy machine gun, on the contrary, is still the undisputed master of the zone of infantry combat.

"The heavy machine guns are being employed by the [rifle?] companies themselves." Their action in Spain has been by direct fire. Fire at long range, overhead or through gaps, has not been used so far. Indirect laying, however, from a position masked by bushes or other concealment has been found useful.

Mortars have demonstrated their usefulness, and have proved themselves indispensable in the attack. Without them, infantry is incapable of overcoming resistance in houses prepared for defense or in other well prepared defenses.

Flamethrowers likewise are indispensable for attack upon houses as well as for fighting in close country.

The Spanish Civil War has demonstrated the need of antitank weapons in the infantry, and has shown the effectiveness of certain types which have been used. The German 37-mm and 20-mm guns have made excellent records on the Insurgent side. (Example: On July 10th, at Villanueva del Pardillo, during the Government Brunete offensive west of Madrid, two Insurgent antitank guns knocked out ten Government tanks. Similar scores have been made by Government 25-mm Hotchkiss guns that have met the Insurgents' lightly armored German and Italian tanks.)

Based upon the above facts, the following would seem to be a practical constitution for the infantry:

Infantry group (the basic unit): 1 corporal and 2 privates armed with automatic rifles and hand grenades.

* This assertion agrees with the British findings during test exercises involving the employment of their Bren light machine guns. See "Employment of New Weapons in British Infantry."

Section: 1 noncommissioned officer and 4 infantry groups.

Platoon: 3 sections.

Company: 3 platoons as above with 1 platoon of four heavy machine guns.

Battalion: 3 companies as above together with 1 company armed with three 81-mm mortars and three 20-mm guns.

Regiment: 3 battalions as above, with 1 company armed with six 37-mm or 47-mm guns on light cars or armored carriers, 1 company of four mine-throwers of 120-mm or 150-mm on motor carriers, a detachment of selected skirmishers, and a detachment for chemical warfare with a platoon of flamethrowers.

Infantry should continue the evolution begun during the World War and should divide itself into special branches, developing them without dependence upon other arms or upon weapons designed to be universally suitable for all purposes.

ARTILLERY

The Spanish civil war has confirmed not only that "without fire there is no advance", but that "without a whirlwind of fire one does not advance even an inch"—so long as the enemy is resolved to offer resistance. Further, it has been demonstrated that the cooperation between infantry and artillery is not only becoming increasingly indispensable but also increasingly difficult to achieve.

The increase in the number of automatic weapons, the use of light, quick-firing artillery from prepared positions and in cross and flanking fire, the rapidity with which it is possible to prepare defensive systems—all have made the offensive more difficult. To have some chance of success, the offensive must be undertaken by a solid and powerfully armed infantry, which is trained to maneuver, and which is accompanied and continuously supported by a powerful artillery—powerful in the number and caliber of its guns and powerful in its ammunition supply. Here is where motorization can be especially useful.

To maintain the indispensable cooperation between infantry and artillery, the latter must establish groups destined for the special assistance of the individual columns of the infantry attack. This task of direct assistance to the infantry should be distinguished from the general, or maneuver, action of the artillery—the latter being entrusted to other groups. This means that the complement of artillery must be increased. Otherwise there will be no advance.

The infantry must regulate its advance upon the displacement ability of the artillery. If the infantry is armed with powerful means of indirect fire—mortars, etc.—it may be able to advance within the zone of security created by its own fire, but not beyond. To attempt more would mean the breakdown of the attack and decimation and demoralization of the infantry.

AIRCRAFT

Great care is necessary in drawing conclusions from the use of aircraft in this civil war and applying them unhesitatingly to a major conflict. Both sides had but few planes at the outset, and the air forces have been built up slowly as the war developed—as was the case in the World War. Secondly, the territory was not prepared with landing fields for the use of large air forces. Finally, both sides received from other countries a varied assortment of models which were not always of recent manufacture. Moreover, the pilots usually were not sufficiently or homogeneously trained. Finally, both sides have refrained from using gas.

With these qualifications in mind, the practical experiences in Spain may be examined. Assault or attack aviation has proved itself most formidable. It can be said without any exaggeration, considering the significant episodes in the Spanish war, that assault aviation is destined to constitute, if not a preponderant, at least a very important part of the air forces of tomorrow. It has had a demoralizing effect upon the troops attacked, particularly against motorized columns and troops in similar dense

groupings. Assault aviation has appeared to be the only new factor tactically favoring the attack (or counter-attack) as against all the other modern factors, all of which favor rather the defensive. From the operative and strategical point of view, it is obvious that the advantage will be with the side which possesses the larger and better organized attack aviation and so secures for itself predominance in the offensive. While assault aviation favors the attacker, observation aviation favors the defender in that it helps to eliminate surprise which is the advantage sought by the attacker.

CONCLUSIONS

Summing up the outstanding lessons learned from the war in Spain, we observe, first, that the defense has constantly shown itself superior to the attack, and this well known difference between the two has, in fact, even increased.

Second, the actual operations, while being of an extremely mobile character, have not fit the theoretical pattern of a war of movement. Static war has been much in evidence at certain points where the defender has established strong resistance. It does not seem logical, therefore, to distinguish between a "war of movement" and a "war of positions." Certainly there exist defensive positions, more or less strengthened, upon which the defender will inevitably base himself, and it would be completely erroneous and illusory to try to deny such an evident fact. But it is equally erroneous to deduce from this that a return to the bureaucracy of the "war of the trenches" is to be expected.

To destroy the enemy in his positions it will be necessary to use tactical superiority opportunely, capably, and intelligently, by alternately employing the operations of attack and defense. But the forms of mass attack must be avoided.

So one commentator views the Spanish scene. We should watch developments to ascertain how closely he has gauged

the war. It would be totally erroneous to accept his conclusions as the final word. This is merely the opinion of one keen observer. Only time will tell how close he approximates the ultimate truth.

INFANTRY ORGANIZATION OF SEVERAL ARMIES (THE COMPANY AND BATTALION)

The charts shown below present in tabular form the current (1937) organization of the rifle company and battalion in several major armies. The figures given have been compiled from data presented in recent military periodicals, and are believed to be correct. For details of the rifle platoon organization of these armies, see Chapter 8, Volume XV, of The Mailing List.

TABLE I

COMPANY ORGANIZATION

Army	Platoons	Auto-rifle	Lt MG	MG	Grenade-throwers or Light mortars
Swiss	2 1 Lt MG plat		12		
French	3		9		9
German	3		9		
Italian	4		12		40 (approx)
Russian	3 1 of MG		9	2	3 or 9 (?)
British	4		12		
U. S. (actual)	3	18			18

TABLE II

BATTALION ORGANIZATION

Army	Companies	Auto-rifles	Lt MG	MG	Grenade-throwers	Light mortars	Heavy mortars	Anti-tank guns
Swiss	3-rifle		36					
	1-MG			16				
	1-heavy weapons						4	2
French	3-rifle		27		27			
	1-MG			16				
German	3-rifle		27	16				
	1-MG							
Italian	3-rifle		36		120			
	1-MG			12				
	1-plat. mortars					9		
British	4-rifle		48					16 (1 AT rifle per plat.)
	1-Hqrs		4			4		
U. S.	3-rifle	54			54			
	1-MG			12				

EMPLOYMENT OF NEW WEAPONS IN BRITISH INFANTRY *

In the new organization of the British Army the infantry brigade, which in general corresponds to our regiment, consists of a headquarters company and three rifle battalions. This brigade contains no heavy machine guns, antitank guns, or heavy mortars; these weapons are found in the machine-gun battalion, or battalions, which form part of the special troops of the infantry division.

Each rifle battalion comprises a headquarters company and four rifle companies. In each rifle company there are four homogeneous platoons, each of which is made up of

* Condensed from *Journal Royal United Service Institution*, February, 1938.

three small sections. ** In addition to the rifle with which the men of the platoon are armed, there is one Bren light machine gun (L. M. G.) in each section and one caliber 0.55 antitank rifle in each platoon.

The Headquarters Company has four L. M. G.'s and a mortar platoon of four mortar detachments, each with one mortar.

Each rifle platoon and specialist group, such as the mortar detachments of the battalion, is to have a 3/4-ton truck for the transport of its heavy weapons, ammunition, and other equipment.

Practically all Regular Army units have been reorganized at the present writing, and the new weapons are in process of production and issue. When all units of the Regulars have been re-armed, the turn will come to re-arm the Territorial units (similar to our National Guard).

In the summer of 1937 exercises were carried out by an independent rifle battalion to test thoroughly the new equipment and organization. In the absence of an adequate number of the new weapons, similar weapons or dummy weapons of the correct size and weight were used.

In view of the imminent reorganization of our own infantry units and their outfitting with new weapons, the conclusions drawn from the British experience are of especial interest.

EMPLOYMENT OF THE BREN LIGHT MACHINE GUN

In tests to determine the handling of the Bren light machine gun during the infantry attack, certain points were brought out. Originally, this gun was regarded as an integral part of the section, never to be taken away. It was found, however, that the gun rarely could be fired when so used unless the section or platoon to which it belonged was working entirely on its own, or had ample room for maneuver.

** See Chapter 8, Volume XV, *The Infantry School Mailing List*, for a description of the British platoon.

In that chapter the British rifle platoon was shown as probably consisting of three 8-man sections—the exact number of men not being known. In a demonstration of the new infantry organization in January, 1938, each section contained only six men.

Further, the action of seeking and occupying good firing positions—usually on the flank—disorganized the sub-units concerned. Riflemen of the section tended to become mere servants of the light machine gun, or else were inclined to forge ahead and leave the L. M. G. and its crew far behind, thus weakening and disorganizing the section. If the riflemen waited for the L. M. G., the advance was slowed down; and in the final phase of the attack, the number of bayonet men was considerably reduced through the consequent disorganization.

In consequence, it was often found that much of the automatic firepower of a rifle battalion was inoperative or could not be employed for covering fire. The heavy machine guns oftentimes not being immediately available to a battalion commander—owing to their grouping into separate battalions—he was left without adequate support. Since battalion commanders will not always be able to depend on the supporting fire of heavy machine guns, it is essential that they be prepared to supply their own covering fire and have at hand sufficient light machine guns to do so.

Accordingly, a different principle was adopted in further test exercises; namely, to make the Bren gun available for use away from its own section when the platoon or company commander desired to use it for some special purpose, such as to provide covering fire for other sub-units. To permit such usage each company commander formed a covering-fire unit of light machine guns which served as the reserve of the company, guns and crews being drawn from the various platoons. Usually one light machine gun was retained with each of the forward platoons for infiltration and surprise, and in order to have some automatic weapons immediately available after the capture of an objective.

When ordered to carry out an attack, a company commander must decide upon the exact armament that each of his platoons is to carry, and must invariably provide for adequate covering fire within his own company.

In defense, the general practice was to post the light machine guns on forward slopes in concealed positions,

and to withdraw riflemen to reverse slopes where they could obtain rest and concealment, avoid casualties, and have a good field of fire to the crestline of the forward slope or probable avenues of approach.

From the application of this practice the following lessons were drawn: Besides providing eighty per cent of their men with cover, rest, and a chance for hot meals, and increasing the facilities for communication and supply, company and platoon commanders were able to obtain the maximum advantage of their firepower. It was realized that although some of the more advanced posts might be lost in the event of a daylight attack by the enemy, this disadvantage would be more than compensated for by the casualties the enemy would suffer and by the increased depth of the company's defensive area.

In the British opinion, this addition of twelve Bren guns to the armament of the rifle company has more than doubled the area that the company commander can now occupy in defense—at least in depth—and, besides introducing the element of surprise, has made possible the adoption of the "reverse slope" principle.

THE ANTITANK RIFLE

Late reports on British experience with the Boys antitank rifle, recently adopted by the British army, indicate that this weapon lacks the characteristics considered essential by our service for a weapon of this kind.

The Boys antitank rifle is a caliber 0.50 (or 0.55) shoulder weapon, weighs some thirty-odd pounds, and with its ammunition, fifty-six pounds. The British carry it in the 3/4-ton truck assigned to the rifle platoon.

Since there is no provision for the close protection of the antitank rifle detachment when in position, it has to depend upon the nearest rifle section or platoon. Inasmuch as the antitank rifle often must be sited several hundred yards from the nearest rifle position, the protection of the gun and its operating detachment often upset the company or platoon commander's scheme for employing the elements of his unit.

On several occasions armored fighting vehicles were able to break through without opposition although warning had been given of their approach. This was due to the inability of the antitank detachments to get to the points selected for them in adequate time, there being no separate vehicles for them to use in occupying positions.

It was also found that the average lance corporal (in charge of the antitank rifle) did not have the requisite tactical knowledge, specialist instruction, imagination, and initiative to successfully site, camouflage, and handle the antitank rifle.

As a result of these findings, it was proposed that several changes be made respecting the organization, assignment, and use of the antitank-rifle detachment. These proposals are:

First, that this gun should be a company instead of a platoon weapon, and that each company have an antitank group (platoon) consisting of four antitank detachments, all under the command of an officer.

Second, this group should have at least one 3/4-ton truck.

Third, each of the four detachments in the company antitank group should have, in addition to its antitank rifle, one light machine gun for its own close protection. Each detachment then should consist of 1 noncommissioned officer and 5 privates—2 privates with each gun and a spare private to act as connecting file, scout, and ammunition carrier. The company antitank groups, then, would consist of 1 officer, 4 noncommissioned officers, and 20 privates.

Fourth, every group should carry enough wire to provide hasty road obstacles pending the construction of road blocks, and the responsibility for siting and constructing these blocks should rest with the antitank group commander.

Fifth, the four detachments of the group should work in pairs in so far as practicable in order to afford each other mutual protection from outflanking movements by enemy combat vehicles.

Since in future wars, armored combat vehicles are likely to play an increasingly important role, which will necessitate constant protection for infantry, it is imperative that well trained antitank detachments be provided and that they have adequate mobility. In this connection, an important duty of the four antitank groups, which, under the proposed plan, would be present in each rifle battalion, would be the picketing of dangerous points while the battalion is on the march.

Another advantage of having an antitank group in each company is that the company commander would have at hand a powerful mobile reserve containing four light machine guns, (besides the antitank rifles) to be used on any occasion when no armored attack is expected.

THE COMPANY MORTAR

All armies appear to be increasing the number of mortars within the infantry regiment, and in many armies these weapons that employ the high-angle fire so necessary in offensive operations, are included in battalion, company, and even platoon armament.

In the British Army, there is now a mortar platoon of four detachments (squads) in the battalion headquarters company. The commander of each mortar detachment is taught that he must be in the shadow of the forward rifle company commander whom he is to support, and that in the attack his weapon should not be used to fire at long ranges. Thus, this 3-inch mortar has become known as "the company commander's gun."

Of the difficulties encountered in last year's training, the greatest was the problem of porterage, because the forward mortar detachments usually found it impossible to keep up with rifle units. Detachment commanders, having to act as forward observers besides commanding their detachments in fire positions, had difficulties in keeping touch with forward rifle commanders. Sometimes their detachments were far in rear and could not give assistance quickly when required to do so. Therefore, it appeared

that some type of mechanized carrier should be provided for the mortars.

It has been recommended that the mortar platoon be composed of five detachments instead of four; that four of these possess a motor carrier; that the fifth be a two-mortar section provided with a 3/4-ton truck, and be used near battalion headquarters principally to provide a smoke screen at any particular moment during the attack. For this reason 75 per cent of its ammunition should be smoke shells. It was submitted that a smaller mortar with a maximum range of 1,000 yards might be used in the close-support detachments. In order to prevent the indiscriminate use of smoke by mortars controlled by rifle company commanders, these close-support detachments should carry 75 per cent high explosive.

The question of communication between the OP and fire position of the mortar detachment remains a difficult problem and one which must be improved. The addition of several men per detachment might help correct this deficiency.

PROTECTION AND MOBILITY

In the exercises of the British 2d Division, the increased frontages and depth of areas occupied made it obvious that rifle battalions should be provided with some mobile organic means for protecting their own flanks, both on the move and when occupying defensive positions.

The present organization of the British battalion includes no unit that could act as a mobile advanced or flank detachment; therefore it has been suggested that the existing intelligence section be increased by two noncommissioned officers and nine privates, and that the section be provided with two 3/4-ton trucks and three motor bicycles for transport. In addition the intelligence officer should have a light car. Each truck should carry an antitank rifle and one light machine gun. It is held that this unit, if constituted as proposed, could perform its regular intelligence mission more satisfactorily than at present, and also it would provide the battalion commander with an

element approximating the scout platoons of the motorized infantry battalions which now form part of the Mobile Division. Battalion commanders when on reconnaissance would thus be provided with the protection which they now lack.

ORGANIZATION

It is proposed that the additional men needed to enlarge the various elements covered above be procured by reducing the number of rifle companies and platoons within the battalion. Where, as at present organized, there are three sections in each platoon, four platoons per company, four companies to the battalion, and three battalions in the brigade, the proposal is to use the "three-unit" principle throughout—that is, as to the number of platoons per company and companies per battalion as well as in other groupings. By so doing, there would be made available for redistribution within the battalion, 7 officers, 1 warrant officer, 10 sergeants, and 190 rank and file. The strength of each company should then be raised by 50 corporals and privates, including the antitank group. This increase in the company's personnel would make it possible to bring up the bayonet strength of the section to 10; this is highly desirable because the identity of the present rifle section as a tactical unit is apt to be lost when two or three casualties have been incurred. After a few losses the small sections will close in on each other, finally merge into one group, and in consequence the advantages accruing from small, maneuvering, tactical entities will be lost.

The foregoing observations on the British infantry organization convey an idea of the many problems incurred in the current endeavor abroad to lighten infantry organization, increase mobility, improve security, and strengthen infantry firepower. Since our own steps toward modernizing infantry units are following a course similar in certain respects to the British, these findings are of interest to us.

THE MOUNTED PLATOON OF THE GERMAN INFANTRY REGIMENT

The German infantry regiment has a mounted infantry (or cavalry) platoon of 31 horses and 32 men organized as follows: a headquarters group of 5 men, 3 combat groups of 8 men each, a combat vehicle (3 men, 1 on a bicycle).

The mission of this platoon is to make reconnaissances and to provide march security for the regiment.

The first of these missions is accomplished by patrols sent forward as far as divisional reconnaissance elements; the second, by patrols which march ahead of the point. The latter mission is carried out by echelon, from one crossroad to the next, the cavalrymen waiting on the crossroads to be joined by the infantrymen.

The cavalrymen are armed only with the carbine.

The personnel of the cavalry platoon may also be employed to fulfill messenger duties within the regiment.

NEW FRENCH TANK AND ITS TACTICS

The D-1 medium tank is now standard in the French Army. The specifications for this vehicle show the predilection on the west bank of the Rhine for *chars de combat* carrying heavy armor and armament even though speed is drastically reduced.

The following data on this tank are taken from accounts in several military periodicals and can be considered as only approximately correct.

Its weight—14-16 tons; length—17 feet, 4 inches; width—6 feet, 10 inches (probably greater than this); height—7 feet, 6 inches; armor—0.79 inch with more on the turret; armament—one 47-mm gun and one machine gun in rotating turret, one machine gun in bow next to the driver. The tank carries 30 shells and 2,000 rounds small-arms ammunition; its crew is three men; its speed 11 miles per hour; cross-country it is 5 miles per hour, on soft ground 2½ miles per hour; its spanning ability is 6½ feet. It climbs over 47-inch obstacle, fords 36 inches of water,

pushes over 12-inch trees, and climbs 35-degree slopes. All tanks are equipped with radio for short and ultra short waves with a telephonic range of two to four miles. This affords communication between all tanks of the unit as well as to the artillery and the next higher headquarters. The antenna can be seen at the rear of the tank. The tank battalions and companies (presumably command tanks only) will shortly be equipped with a radio which will permit reception from aircraft.

According to a supplement to the "Provisional Regulations on the Employment of the D tank", the D-tank units are a reserve of the higher commanders and when needed are attached to the division. The division commander defines the sectors in which they will be employed and what regiments or (exceptionally) battalions they will support. In this way the boundaries of the tank units and the infantry are harmonized. These tanks are *attached* to a "combat group"* or a regiment *only*: (1) when a meeting engagement is imminent; (2) in pursuit; (3) for counter-attack—and then only when division into sharply defined sectors makes such attachment advantageous because of the width of front assigned. Because of the limited speed of D tanks, they are attached to mechanized units only when the latter have the mission of attacking weak, surprised, or shattered forces. However, they should form the backbone of mechanized detachments such as motorized reconnaissance battalions and motorized cavalry brigades which are to advance deep into a broken hostile front. In both cases self-propelled artillery should be attached to support the tank attack.

The regulations thoroughly discuss cooperation with infantry. Tank reserves are *not* held out, and as a rule all four platoons of the company will be employed together, thus giving the company a 600-800 yard front, which corresponds with that of the infantry battalion. Against a weak enemy this breadth can be extended to coincide with that of the regiment, in which case the tank company

* Combat group as here used probably refers to a force consisting of infantry and artillery.

should make its main effort on but a part of that front. The interval between tanks should never be less than 50 yards. The mission of the tank is to eliminate hostile weapons holding up the infantry advance, thereby relieving the artillery so that it can more effectively support the attack.

Contrary to previous practice the regulation provides that preparation for the tank attack should be abbreviated. In combat the tanks should be continually protected from the hostile antitank guns by infantry and artillery. Where this cannot be done, it should be performed by *self-propelled accompanying batteries.* (Editor's italics.)

The tank assault should jump off at the same time as the infantry assault. To this end the tanks of the higher command advance in two waves over a depth of 200 yards with self-propelled accompanying guns in the first wave. Behind these tanks come the infantry supported by light accompanying tanks over a depth of 500 yards. The D tanks should be employed behind the infantry only in those sectors over which they cannot advance without prior reconnaissance, and where infantry must first occupy the terrain.

Commenting upon this method of employment in *La France Militaire,* General Culmann questions the advisability of using D tanks ahead of the infantry. The distance between the tanks and the foot troops is constantly increasing and by the time the infantry has reached the enemy position, the paralyzation caused by the tank attack will have passed. He believes that the introduction of self-propelled artillery into the action will bring about a modification of the regulations whereby the breakthrough power of the medium tanks will be exploited to better advantage.

A larger medium tank, weighing between 25 and 30 tons, has also appeared in the French Army. This tank is reported to have very heavy armor, somewhat on the order of 1½-inch. The armament consists of a cannon and machine gun in a combined mount in the rotating turret; a

second cannon in front to the right of the driver; and another machine gun in the rear of the tank.

FRENCH CORPS OF OFFICER-MECHANICS

In December 1937, an official decree announced the formation of a corps of infantry and tank officer-mechanics within the French Army. This corps is charged with insuring the maintenance of special materiel, primarily tanks and other motor vehicles. It will contain 175 officers of all grades from second lieutenant to colonel. Four tenths of these officers will be obtained by promoting non-commissioned officer-mechanics to the grade of second lieutenant. Another fraction will be selected by competitive examinations open to enlisted mechanic specialists and to reserve officers holding diplomas or certificates issued by certain schools.

In the meantime, while the permanent corps is being built up, temporary assignments to the corps will be made from active infantry and tank officers who are or have been on technical duty or who hold diplomas or certificates from certain schools.

TANKS AGAINST TANKS

From warring Spain have come several accounts of tank battles. In these encounters between opposing ironclads it it is reported that thinly armored and machine-gun-armed Rightist machines have been no match for the heavier, and more powerfully armed, Leftist tanks. Apparently when tanks of different capabilities run into each other the same thing occurs on land as when cruisers meet battleships at sea. The cruisers can either run away or fight it out and risk being sunk.

Such combats have long intrigued the navy-minded and tank-minded British with the result that their mechanized forces have given considerable thought to the tactics which

land Monitors and Merrimacs should follow when a hostile armored fleet is met. There is a striking parallel between the methods used by British seamen and tankmen.

In July, 1937, Salisbury Plain was the scene of an engagement between two mixed tank companies.* One company had to cross a stream defended by the other. To increase the probability of hits, both the light and medium tanks fired broadside, usually from positions affording turret defilade. Changes of position always were carried out under the protection of smoke screens created by the close-support tanks. Orders were transmitted by radio-telephone, using a separate wave length within each tank battalion, higher headquarters, aircraft element, and combat train. When the radios failed, small flags were used for communication.

Thirty different signals are contained in the flag code. These were found to be ample, and, in fact, there is some difficulty experienced in memorizing so many. The fewer the signals, the clearer the order. Too many signals increase the *probability of misunderstanding*.

Tank versus tank fighting was always of short duration. The tank which got in the first well-aimed shot *from a halt* was usually the victor.

Tank engagements develop suddenly, as a rule, and there is little or no time to issue orders by either radio or flags. Such orders as can be given are mostly for units in rear which have not yet become engaged.

In later maneuvers of the British tank units there were three other times when tanks fought tanks. From watching these, many observers decided that the outcome depends a great deal on chance. So much so that Liddell Hart opines that tank engagements should be avoided—a solution that may not always be possible.

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* The British mixed tank company consists of 5 medium, 7 light, and 2 close-support tanks (armed with a mortar for firing smoke shells).

ANTITANK DEFENSE

From a study of current European doctrines a Russian author concludes that—

1. Every infantry attack will be supported by tanks, varying from 10 to 25 against each thousand yards of hostile front and as high as 50 in important sectors.

2. A division front in defense, says this Russian author, varies from 4,400 to 8,800 yards. Against this front the tanks will hit three successive lines of antitank defense:

In the first line, antitank cannons of 20 to 25-mm caliber.

In the second line, 47-mm antitank cannons.

In the third line, 47-mm antitank cannons and regimental and divisional artillery.

3. Infantry allotments of antitank guns should be based on one gun per 100 yards of front.* Each gun should be able to neutralize from 3 to 4 tanks. A divisional reserve of antitank guns should be provided for reinforcing regimental weapons in dangerous sectors.

4. In some armies, part of the antitank missions are given to infantry automatic weapons. These should be considered merely as make-shifts.

5. The cannon tank does not seem to be seriously considered in antitank defense. Some maintain, however, that such a machine would be very effective.

The intervention of aviation does not seem to be held as a practical means of action in the defense against tanks.

TRAINING FILMS

(United States)

Volume XIV, The Infantry School Mailing List, issued in July 1937, contained in Chapter 8, an article on "Training Films and How to Use Them." This article illustrated a technique for using training films. It also contained a

* From this it should not be assumed that guns are sited 100 yards apart along the front. Rather, they are echeloned in depth.

list of all War Department training films released up to July 1937. Since then three training films of especial interest to the Infantry have been released. The titles of these films with a brief synopsis of their contents follows:

T. F. 25. *Bayonet Training.*
9 Reels.
(This picture shows in detail a complete course in bayonet training. Many scenes are in slow motion. A squad is used to demonstrate instructional methods. One part is devoted to the use of the training stick and methods of conducting squad competition with training sticks. The last reel shows the running of the qualification course.)

T. F. 33. *First Aid.*
4 Reels.
(This film shows how first aid may be accomplished by simple methods. The first two reels show how to use the first aid packet and the ways to stop bleeding. It further shows the proper method to apply a dressing and bandage to bleeding wounds to prevent infection. Reel 3 shows how to determine when a bone is broken. It also shows how to handle a man with a broken bone and the types of splints, together with the proper methods used to apply them. Reel 4 shows how to place a wounded man on a litter and the proper method of carrying a wounded man on a litter. It further shows how to pick up a wounded man and the methods of carrying him in the arms or across the shoulders.)

T. F. 35. *Infantry Hasty Field Fortifications.*
6 Reels.
(This film shows the digging of skirmishers' trenches, foxholes, caliber 0.30 and caliber 0.50 machine-gun emplacements. The proper methods of using infantry intrenching tools are

demonstrated. It also shows how to emplace and camouflage the 81-mm mortar. Observation and command posts are constructed and camouflaged. The methods of camouflaging motor vehicles and hasty field fortifications are also shown. One reel is devoted to the details of constructing the double apron barbed wire fence and other wire obstacles.)

AVIATION IN CURRENT MILITARY OPERATIONS *

I

AIR TRANSPORT

The movement of troops and supplies by air is no longer a novelty in military operations. During the past few years, however, this procedure has reached undreamed-of proportions. Outstanding among the achievements in airway logistics are those scored by Italian, British, Spanish, and Russian military aviation.

Italian.—In the last three months of the Ethiopian campaign, the Italians frequently resorted to air transport to supply troops operating beyond the capabilities of motor and animal transportation. During this period over 500 tons of material were dropped, and of this amount 385 tons were carried during the three weeks from April 4 to 22, 1936.

This supply by air enabled large units to live, march, maneuver, fight, in unexplored zones where climate, rugged terrain, and absence of water and vegetation conspired against the movement of modern armies. When a supply item was such that it could stand the shock of hitting the ground, it was merely dropped in a sack filled with straw or hay, or simply thrown overboard. For more delicate

* This discussion of aviation has been in general confined to those aviation matters that seem to have a particular application to, or interest for, ground troops, especially infantry. The broader and strictly air viewpoint has not been considered except incidentally.

provisions the parachute was employed. Water was put in large cylinders holding 25 to 50 gallons, having springs to reduce the shock and a parachute to slow the rate of fall. These were released by opening a trap under the fuselage and allowing the cargo to drop. A number of airplanes were especially fitted for transporting supplies. The supplies often were packed in padded canvas containers carrying about 200 pounds each. The parachutes used were inexpensive affairs made of treated cotton material. In Dankalie, live kids and sheep were flown from the coast and were dropped by parachute for the subsistence of detachments crossing the desert country—the first instance of transporting live animals for the supply of units on the march.

Another noteworthy use of airplanes was the transfer by air of the whole of Marshal Badoglio's headquarters—including all services, personnel, archives, telephone and telegraph equipment—from Quoram to Dessie, a distance of 165 kilometers, in an hour and a half. Some sources indicate an even longer move was made in the time given.

Following the capture of the Abyssinian capital, eight large bombardment planes in twelve days transported a battalion of 21 officers and 798 men from Makalle to Addis-Ababa, a distance of over 300 miles. With these men were transported all their weapons, munitions, packs, and ten days of reserve rations and replacement articles. On one trip six radio stations with engineer technical personnel made the hop.

Some hundred other troops, in the space of twenty-four hours were flown to Diredawa and other places of strategic importance. Food and medical supplies had to be conveyed by heavy aircraft during the next few weeks from Asmara to Addis-Ababa.

As operations were continued in various unsubdued sectors, air transport became increasingly used. In the Cercer, Garamullata, and Arussi sectors, aircraft operated 150 to 200 miles from their bases, making 2,324 flights in a total flying time of 6,084 hours. During these flights 152 tons of explosives and 348 tons of provisions and sundries

were dropped or carried, and 1,456 persons were moved.

From 7 January to 24 February, 1937, various columns in the Lakes and Bale sectors were supplied by air with 65 tons of food and munitions. From October to December, 1937, in the southwest sector, 31 tons of provisions and munitions were carried by aircraft.

The air losses of the Italians during their Ethiopian operations are interesting—

Machines hit by antiaircraft fire, October 2, 1935 to March 31, 1937	316
Machines brought down during this period	12
Pilots and specialists killed during this period	128
Pilots and specialists wounded during this period	102
Proportion of officers killed and wounded	43.23 per cent.

Spanish.—At the outset of the Nationalist revolt which initiated the present civil war in Spain, General Franco in two weeks ferried by air 6,000 men from Morocco across the Straits of Gibraltar to Algeciras, Spain. In the space of four weeks, 13,000 men and 500 tons of war materiel were flown across the Straits. Italian Savoia-Marchetti trimotor planes accomplished this air ferriage. This operation could not be carried out by water owing to the patrol maintained by elements of the navy that remained loyal to the Madrid Government.

The Nationalists have also used their air force to supply food to beleaguered garrisons. The defenders of the Alcazar in Toledo received a little help in this way in the early days of the war. Last fall, when Government forces surrounded Belchite on the Aragon front and kept it cut off for about two weeks before closing in to complete its capture, the Nationalist defenders were kept from starvation by food which was dropped from friendly planes.

These examples call to mind various disasters throughout the world where airplanes have brought manna to peoples isolated by reason of floods.*

* In recent maneuvers in Texas a platoon of the 1st Cavalry was provisioned by airplanes for four days. Ration articles were dropped in containers suspended from parachutes. In one delivery there were forty-eight eggs; only two were broken.

British.—On the Northwest Frontier in India, and especially in Waziristan, aviation has been increasingly employed since the World War for moving troops and supplies across areas where roads are poor or non-existent and where motor convoys are subject to raids by dissident tribesmen. From September to November, 1937, the South Waziristan lines of communication were closed to military traffic. During this period, 62 tons of supplies and 2,674 men were conveyed by bomber transport aircraft between Wana and Manzai. In the three months from June to August, 1937, a detached flight of Squadron No. 70 transported over 140 tons of supplies and 1,570 personnel, including many casualties and sick. Also, a mountain battery near Wana was relieved by air on November 17th.

The Waziristan campaign, 1936-37, has now been brought to a successful conclusion. About 61,000 men were in service; casualties amounted to 927 killed and wounded and 74 deaths from sickness. Much credit for the success of this campaign must be given to the Royal Air Force for its execution of missions of transport, escort, reconnaissance, patrolling, bombardment, and dissemination of warning leaflets and proclamations. In many cases, mere demonstrations of air power sufficed to warn the tribesmen and bring about their submission.

Russian.—The army of the U. S. S. R. is celebrated for doing things in a big way. Biggest among its big things perhaps is its aviation, which numerically, at least, is fighting for first place among world air forces. We have already recorded in Volume XIV of The Mailing List, the Russian achievements in transporting air infantry and parachutists during the maneuvers of 1936. In the 1937 maneuvers, mass parachute landings again were made. A force of some 1,200 infantrymen, largely machine gunners, was landed several miles behind the enemy front to support a breakthrough by a brigade of tanks.

German.—When a sizeable part of the German Army moved by motors into Austria in March of this year, an advance detachment, variously reported by the press as from one to three thousand men, was flown direct to the

main Vienna airport by a huge fleet of big bombers. It is reported that on the same day many others were landed at different points of entry and *exit* along the Austrian frontier. This is a significant example of what aircraft can accomplish when hours and minutes are of prime importance in a strategical troop movement.

In fact all of these examples of what aviation can do in war besides reconnoiter, observe, bomb rear-area objectives, and attack ground troops, are of momentous significance. In military periodicals occasional mention is made of the potential value, in the event of mobilization, of the thousands of large busses found in the United States. Perhaps to this means of rapid transport which could be drawn upon in an emergency, we should also add our commercial passenger planes, which outnumber those of any other nation in the world. The air transport of troops and supplies would be especially valuable in the event our rail and highway routes were destroyed by hostile bombardment, say, in the defiles such as exist in the Rocky Mountains. The three hundred commercial planes which were operating on scheduled flights over the airways of the continental United States in 1937 would go far toward alleviating the disastrous effect that such hostile action would have if a movement of troops were under way toward the west coast.

Also available for the movement of personnel, if an emergency demanded their being diverted to such use, would be the transport planes—or even bombers—of the U. S. Air Corps. During the Air Force maneuvers on the West Coast in May, 1937, several hundred mechanics and specialists constituting the advanced echelon were carried as passengers by army air-transports. These planes, which are normally used in the daily supply of air corps equipment from the depots to the operating bases, can also be used during maneuvers or in an emergency for transporting personnel. In early March, 1938, over a hundred men were flown as passengers from Selfridge Field, Michigan, to Florida in four and one-half hours. The carriers were our new "flying fortresses."

Among long distance flights, our Army and Navy planes have made many remarkable records. In January, 1937, twelve flying boats flew the 2,600 miles from San Diego to Honolulu in 21 hours and 43 minutes; in April, twelve others made the same hop and cut three minutes from the flying time. In June, 1937, twelve flying boats jumped from San Diego to Coco Solo, Panama Canal Zone, a distance of 3,087 miles, non-stop, in 27 hours and 58 minutes. In February, 1938, six B17 Bombers, carrying a total crew load of 49, flew non-stop from Miami, Florida, to Lima, Peru—a distance of 2,800 miles—at an average speed of nearly 200 miles an hour. From Lima they hopped to Buenos Aires, some 2,000 miles. The return trip was made by way of Santiago, Chile, Lima, and Panama to Langley Field, Virginia.

These exploits in air transport and supply of ground troops, and the radius and speed attainable, as the French say, "Give one to think."

II

ATTACK OF GROUND TROOPS

The strafing of ground troops by attack aviation got its start during the World War, so it is not new to warfare of the twentieth century. Yet it has become far more common in recent military operations than it was on the Western Front. The Italians bombed and machine-gunned retreating Ethiopians and turned their retrograde movements into runaway routs. The British and French have had recourse to aerial attacks in their colonial operations against disaffected tribesmen. Both Rightists and Leftists in Spain have hurled thousands of tons of bombs and millions of machine-gun bullets at the other's ground troops. Japanese superiority in the air has caused the Chinese to suffer merciless attacks from the skies.

It is contended by airmen that such employment of aircraft is less valuable in prosecuting a sound campaign than the attack of vital targets in rear areas—airdromes, munition plants, supply bases, railway centers and other

critical points on the lines of communication. They claim that artillery rather than airplanes should be used against troops that are in position or are making an attack. No doubt this is sound in theory, because artillery can keep pounding hour after hour whereas an element of attack planes can maintain its fire only for a matter of seconds or minutes, and then must return to its base for munitions and possibly for fuel, repairs, and relief of the pilots. Moreover, loses are likely to be heavy when planes become flying artillery and machine guns, and replacements for these losses will be slow and costly.

Yet, costly or not, the fact remains that combat aviation has attacked infantry which has been defending, attacking, retreating, or marching far from the front, either by shank's mare or on wheels. And the results in most cases have justified the air action—at least from the assailant's viewpoint. This increased use of combat aviation against ground troops is generally ascribed to three particular circumstances:

First, in many parts of Spain—as in Ethiopia and on the French and British colonial frontiers—the nature of the terrain made the employment of artillery difficult, if not impossible.

Coupled with this factor in some instances was an acute shortage of artillery; this was true in Spain, particularly during many of the early battles, and was also the case in the initial Japanese operations at Shanghai.

Finally, the need for a bombardment to be delivered with utmost speed, and oftentimes beyond the range of artillery, made the air arm the only one capable of accomplishing the mission. Oftentimes—in Ethiopia, in Spain, and in China—the progress of an attack was so rapid that artillery could not keep pace with the infantry advance. Attack aviation was the only alternative. It provided the support and covering fires normally furnished by artillery.

This increasing intervention of air forces in the ground combat gives rise to many questions. Is there a role for aviation paralleling that of tanks and artillery? If there is, should a special type of small, inexpensive, slower-flying

attack plane be added to the types already standardized in order to provide aircraft which, from small fields near the front, can quickly come to the aid of infantry when supporting artillery and accompanying tanks cannot give the necessary support? Perhaps a species of "accompanying planes" is needed to meet the conditions imposed by modern methods of waging war.

These are questions that arise in one's mind when reviewing the role of modern aviation. The answers cannot be given unequivocally at this early date. However, there is one conclusion that can be drawn, without reservation, from the modern use of warplanes. It is this: *Infantry can never afford to neglect its antiaircraft defense and must always be seeking to improve its methods in order to keep up with modern development of airplanes.*

CHAPTER 9

Movement of Troops by Motor Transportation

(SHUTTLING)

(INFANTRY SCHOOL TEACHING)

A new element is being introduced into military motor movements—that is, the movement of an infantry organization by using organizational motor transport only. True, the employment of motors to move troops is not new; it was used extensively during the World War. However, it should be noted that these motors came from outside sources and the movement, so far as the transported organization was concerned, was conducted in a manner not so much different from a rail movement. But the method of using organizational transportation to move the entire organization is a new growth and has already acquired a name—*shuttling*—since the motors make several trips back and fourth in order to move the entire organization.

We say this method is new, and so it is to this generation, but actually it is old. In 1806 Napoleon moved the Imperial Guard from Paris to Osnaburg, a distance of 433 miles in 13 days, or an average of 33 miles per day, by shuttling the troops on farm carts.

In solving a problem involving the use of organizational vehicles the amount of transportation available within the regiment is one of the first considerations. However, different regiments have different amounts of trans-

portation assigned. In these days of change the composition of the regiments often differs. But for the discussion here, and the problem that follows, we have adopted one type regiment and furnished the tables necessary to illustrate the principles and solve the problems. (See Tables I and III.) However, it should be understood that the principles utilized do not apply to this type organization alone. They can be applied to any organization. Table I shows the number of officers and men in each unit of the regiment under discussion for which no organic transportation is provided; the table also shows the number of 1½ and 2½-ton trucks required to transport each unit.

In any situation, in order to obtain the number of vehicles available for troop transportation, it is necessary to eliminate all transportation in the regiment that is used for command and administrative purposes because these vehicles will be required at all times for their normal functions. The vehicles thus eliminated will include motorcycles, reconnaissance cars, light passenger and cross-country cars. The ½-ton pick-up trucks are inefficient for transporting troops on account of their limited capacity, so they will be eliminated also. This leaves the following 1½-ton trucks in the regiment available for the movement of foot elements:

Combat train trucks		14
Field train trucks—		
Baggage	21	
Gas in containers	3	
Water in containers	5	
Ration and kitchen	20	
Total field train trucks		49
Hq. Co. trucks (Co. trains)		7
Total		70
Co. trains of regimental motorized units (less Hq. Co.)		49
Total		119

The question relative to the proportion of the trucks just listed which can be made available for moving the dismounted elements of the regiment is a decision that must be made by the commanding officer concerned. In cases where a tactical situation will likely confront the regiment on its arrival in the new area, it will probably be necessary that at least part of the machine guns and antitank guns accompany the first dismounted elements moved. Parts of these elements must also be present in cases where the march of the regiment requires antiaircraft or anti-mechanized protection. Since these units are motorized and the motors on arrival in the new area must be retained for tactical purposes, it is obvious that fewer trucks will be available for the transportation of foot elements. On the other hand, where no tactical situation confronts the regiment the number of trucks that can be used reaches the maximum.

By referring to Table I we see that 109 1½-ton trucks are required to transport the 1,623 dismounted men of the three rifle battalions and Headquarters Company. If the 49 trucks of the machine-gun and mortar companies are not available for the movement it can readily be seen that some of the remaining 70 trucks will have to make two trips with personnel.

Each truck in the regiment carries a prescribed load, either materiel, or personnel and materiel. When a truck is used for other purposes, such as the transportation of foot troops, its normal load must be unloaded. This fact injects another time element into the procedure. Consulting Table II, paragraph 2, we see that after receipt of orders to move troops, the time required to place motor transportation in condition to leave the location at which it receives its orders is as follows:

Trucks empty.....15 minutes
Trucks loaded..... 1 hour.

Also, one hour should be allowed for reloading after trucks have completed the transport of personnel and have returned to the bivouac to pick up their normal loads.

The maximum distance a regiment can move using the "shuttling" method of transporting troops will depend on several factors. The main factor is the distance trucks can travel in one day. Consulting Reference Data, 1937, Command and General Staff School, we find that 200 miles per day for short periods is the maximum distance for troop movements by motor transportation. This is considered a reasonable distance on good roads, and will allow sufficient time for the care of trucks and the necessary rest for drivers. Let us apply this to the regiment under consideration. As stated before, if less than 109 trucks are used to transport foot troops some of the trucks will have to make extra trips as follows: the first trip loaded with personnel; the second, return empty to pick up personnel; the third trip with personnel; the fourth, return empty for normal loads; and then the fifth and final trip to the new bivouac transporting their normal loads. (However, the above is not a rigid method of transporting the unit; normal loads, for instance, could be carried on any trip forward instead of the fifth trip.) Thus we find that 200 divided by 5 equals 40, or the approximate number of miles the regiment can move in one day when it has to shuttle five trips.

Other factors which have a bearing on the subject are: condition and kind or roads, the weather, traffic restrictions, such as other units having priority on roads that cross the line of march, measures taken to insure secrecy of the march which may include a prohibition on the use of lights, which in turn reduces the speed of the convoy. The number of hours of darkness, the mechanical condition of the trucks, and the undersirability of permitting double banking on roads, are additional factors which must be considered.

Taking into consideration all the factors and circumstances just enumerated, it will generally be found that in order to move as much as 30 miles in a night in cases where the transportation of regimental motorized units—such as antitank and machine-gun companies—is not used to transport rifle units, it will be necessary to march

the rifle units part of the way. For instance, the first serial transporting personnel can stop short of the destination at a previously reconnoitered "turn-around." The troops unload from the trucks and march the remaining distance. In the meantime the personnel who are to be transported on the second trip start marching as soon as the first serial clears the initial point. The trucks which transported the first serial, after turning around, move back along the line of march, make another turn around, halt, close up, and pick up the troops of the second serial, which have been marching, and transport them to the final destination. This is one way of solving the problem but there are others. The shuttling system is flexible depending on such variable factors as number of trucks, road blocks, speed of trucks, comfort of the troops and so forth.

Double banking on roads, i.e., one column overtaking and passing another on a two-track, two-way road, is to be avoided. The reason for this is that it denies the use of the road to vehicles and convoys moving in the opposite direction, while the two columns are passing.

The easiest method of deciding on the details of a movement and making the calculation for such a movement is by the construction of a march graph. In plotting a serial on the graph it is first necessary to know the number of vehicles in the serial and the road space occupied by each vehicle. Table II gives the following road spaces per truck:

March rate at 5 to 15 miles per hour.....35 yards.
March rate at 16 to 25 miles per hour.....50 yards.

The space occupied by each vehicle may be ordered at a greater figure, such as 100 yards or one tenth of a mile. This, though it lengthens the column, in no way changes the method of solving the problem.

Having determined the *road space* by multiplying the number of vehicles by the amount of space occupied by each vehicle, we next find out the *time length* of the serial at all prescribed speeds. The *time length* is the time in minutes required for the serial to pass a given

point. It can be calculated or it can be determined directly from the Humphrey scale.

The next step is to determine the *time distance* for the serial under consideration for all prescribed speeds. The *time distance* is the time required for the head of the serial to travel the prescribed distance. It is obtained by dividing the road distance by the prescribed rate of speed or it can be taken from the Humphrey scale.

Having determined the *time length* and the *time distance* at the prescribed rates of speed, the movement of the serial is plotted on the graph.

In constructing a graph we mark the mileage on the left-hand margin, opposite the horizontal lines and then mark the hours on the bottom margin in prolongation of the vertical lines. Restrictions on the march, such as road blocks and lines beyond which lights will not be used on vehicles, are then plotted on the graph. In addition, perpendicular lines are drawn indicating the period of darkness. The required measurements must be made on the map before the items just discussed can be plotted. In the plotting fifteen minutes are allowed for the loading and ten minutes for the unloading of troops. The time allowed for the trucks to turn around will depend on the length of the road used to make the turn around.

In order to obtain a clear picture of the shuttling method of moving troops it might be well to analyze the graph of a shuttling movement. Figure 18 is a sketch showing the country through which a movement is to be made. The old and new bivouac areas are shown and also the route of march. Figure 19 is a graph form for a contemplated movement along route: CR 589—CR 601—north exit of Dillsbury—CR 424. Chart I is a tabulation of the serials to be plotted on the graph. Since, for the

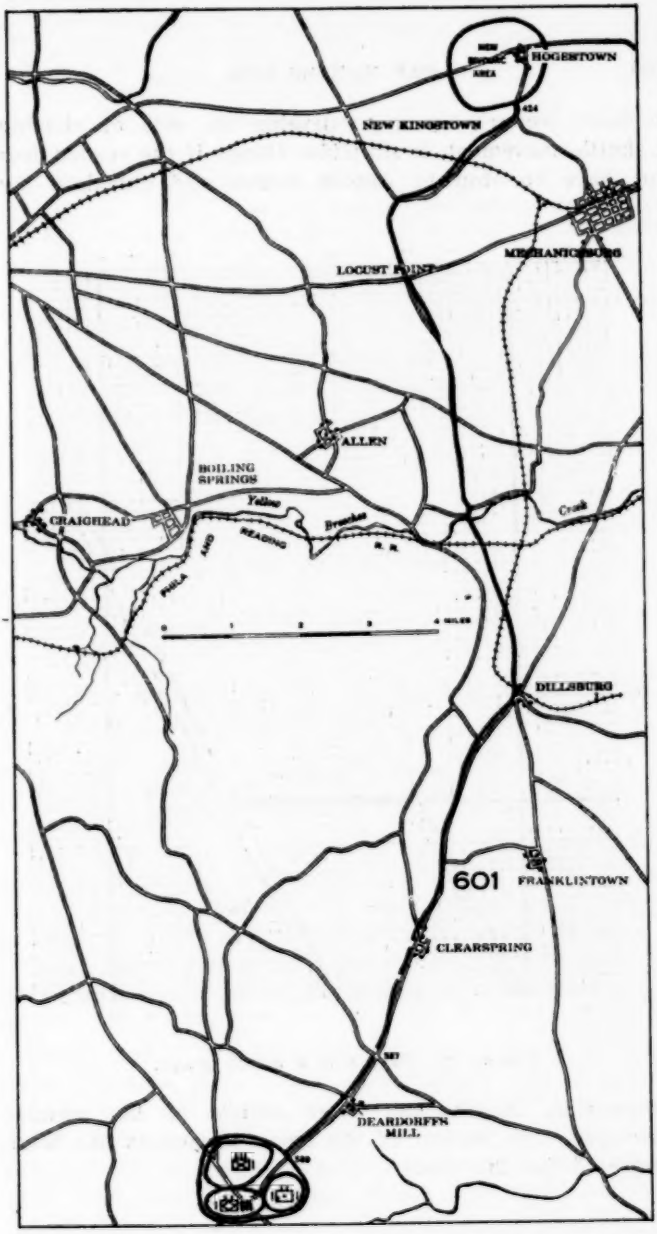

FIGURE 18.—Sketch of terrain showing routes and critical points. (Taken from Carlisle Quadrangle.)

moment, we are trying to develop the idea of plotting a shuttle movement, it simplifies things if the reader does not have to stop to consult tables and calculate the

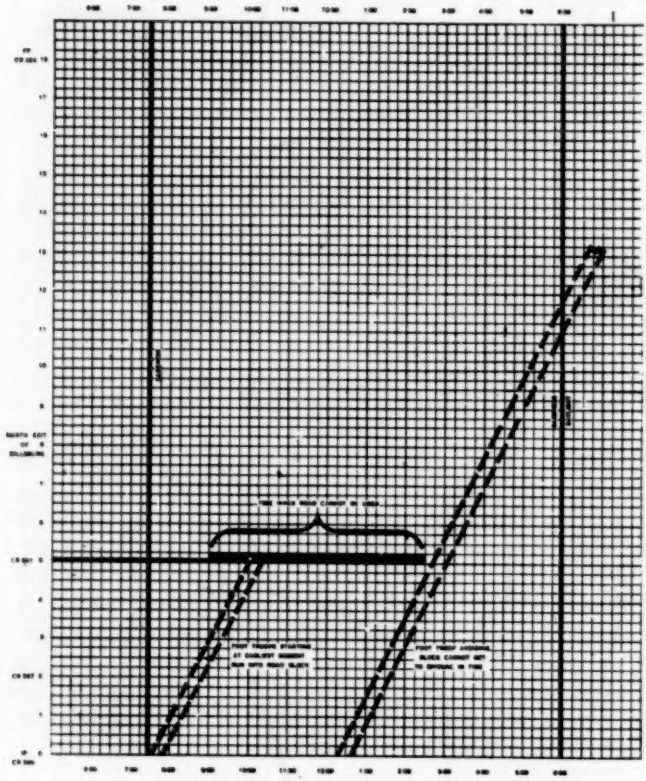

FIGURE 19.—Beginning a march graph.

composition, length, and other details of his serials. Therefore, this portion of the troop movement has been completed for the reader.

CHART I

1. Combined trucks and tanks
   1st Inf —119 trucks (motorized units)
   1st Bn 901st Inf (Lt. Tks.)—48 trucks and 54 tanks

Rate	: 8 mph
Road space	: 7,735 yds
Time length	: 34 mins

2. 114 1½-ton empty trucks (necessary to carry foot troops. These trucks obtained from serial 1, after serial was unloaded.)

Rate	: 8 mph
Road space	: 3,990 yds
Time length	: 17 mins

3. Foot elements 1st Inf (on foot)
   (3 Rifle Bns, Regtl Hq Co and Band)

Rate	: 2 mph
Road space	: 950 yds
Time length	: 17 mins

3a. Foot elements 1st Inf, transported in 114 1½-ton trucks (attached)

Rate	: 8 mph
Road space	: 3,990 yds
Time length	: 17 mins

Note that along the bottom of the graph is the time scale; each square representing fifteen minutes. Along the left-hand vertical edge is the distance scale, plotted in miles. It will be noticed that at certain points prominent terrain features along the route, like CR 587 and CR 601, are entered at their proper distance from the IP, CR 589.

Often it will not be possible to use a route continuously. Troops from other organizations will be given priority and for certain hours our route will be blocked. Such blocks should be shown on the graph. The black rectangle on the graph (Figure 19) shows the place where (CR 601) and time during which this route will be unavailable for our traffic. We must avoid interference

with the troops moving across our front, while in the process of making our own march.

Keeping this road block in mind and forgetting all nonessential detail, we can simply state that orders require the commander to move his troops, on the route given, eighteen miles between 7:30 PM and 6:00 AM (hours of darkness). This would not be a difficult problem if the march could be conducted without interruption, even if lights were not used, thus reducing the speed of motors to eight miles per hour. But on the route assigned we find that at CR 601 there is a road block, mentioned before, due to another column moving toward the east across our line of march and prohibiting any movement through CR 601 for several hours. Any movement to the new bivouac must be made without interfering with this troop movement blocking CR 601. Close study will indicate that there is no way of avoiding the road block and completing the movement by marching the foot troops within the time allotted. Nor can the movement be completed by a straight motor movement with the trucks available (114). It may be interesting to check both of these movements, since it will show that to accomplish the task we will have to resort to shuttling. Let us continue the analysis to show why this is so, and to indicate how such a movement should be plotted on a march graph.

The first thing noticeable is that the elements marching on foot, if they start at the earlist possible moment (7:30), cannot clear CR 601 without running into the troops marching parallel to the front and which cross our route at that point. But, on the other hand, if they start later from their bivouac and pass CR 601 just when it is cleared for our use, these same elements cannot reach by marching the new bivouac before 6:00 AM. (See Figure 19.) That is the crux of the problem. How then shall we go about making this movement?

Casting about, we find that a motor column with its extra speed can clear CR 601 prior to its being blocked. It would appear then that the best thing to do is to send a motor column which has speed enough to clear CR

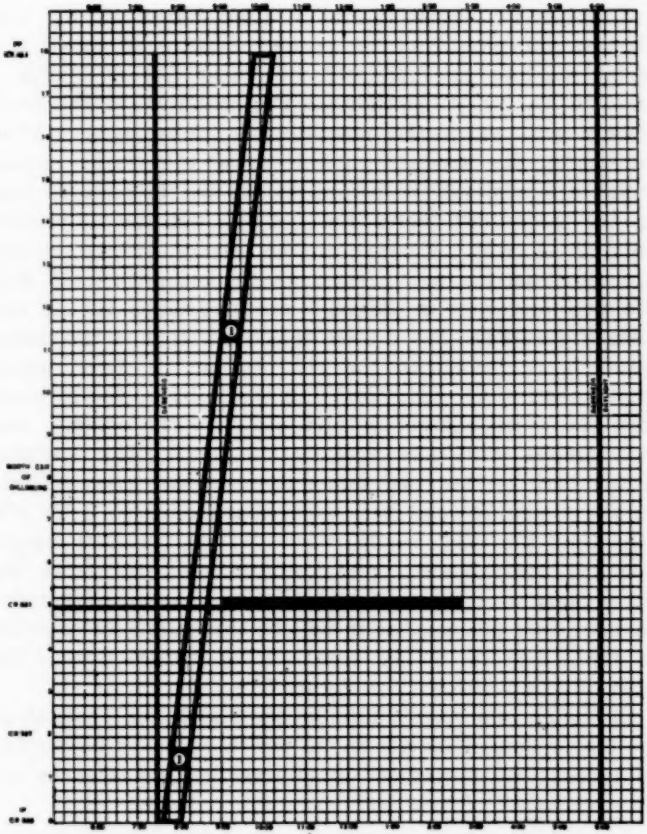

FIGURE 20.—First serial plotted in.
(Motors contain normal loads of personnel and materiel.)

601 prior to its blocking by other troops. We can get something through at once and have one serial out of the way and then see what can be done with the remaining troops.

Suppose we choose Serial 1 (See Chart I) for this purpose and plot it on the graph.* Figure 20 shows this serial starting at 7:35 PM will clear CR 601 with a factor of safety of 15 minutes. The graph shows the truck column will reach the new bivouac quite early. After detrucking the troops, we will have 114 empty trucks which are available to return to the old bivouac to pick up the troops left there. But CR 601 will not be cleared until 2:45 AM. Therefore, the empty trucks cannot proceed from the new bivouac to the old until 1:15 AM. We will plot that as Serial 2 in solid lines to CR 601 (See Figure 21). The dotted lines show that if the motor serial is continued to the old bivouac its head would arrive about 3:30 AM. To bring the tail into the bivouac, turn the truck column around, close up the column, and load troops will take roughly an hour. The variable factor here is the time taken to turn the truck column on the available road net. One hour added to 3:30 AM (the time the head would reach the old bivouac) means that the troop loaded truck column could not leave the old bivouac site before 4:30 AM. At a speed of 8 miles an hour this means that it will be impossible to traverse 18 miles and be in the new bivouac before 6:00. The dash line shows this (See Figure 21).

Off hand, one might jump to the conclusion that, since the troops cannot march to the new bivouac or be carried on trucks, the movement is impossible. Yet this is not

* In plotting a serial the simplest way is as follows: Determine the hour and minute of starting. Place a point there. Along the left margin find the point representing the number of miles the serial travels in one hour. Follow this line into the graph until a point is reached exactly one hour later than the time the serial is to start. Place a point here. Now we have two points. With a straight edge accurately aligned on these points draw a line through the points and continue it to the new bivouac area. This will give the time the serial arrives at its destination mechanically and without computation.

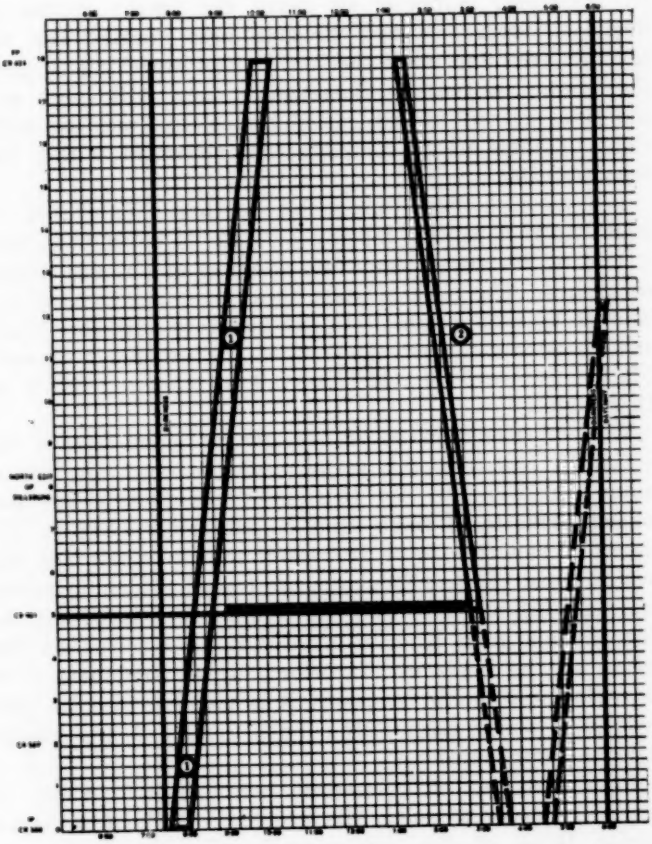

FIGURE 21.—Second serial plotted in.

the case. True, we cannot move the foot troops by marching nor can we move them all the way by trucks, but what about a combination of these two methods—that is, shuttling? Suppose we move the empty trucks of Serial 1 from the new bivouac area toward the old bivouac area and start the foot troops marching to meet the oncoming trucks. Somewhere they will meet and the time gained by the marching column may be sufficient to allow us to complete the movement within the required time.

Let us look into this a bit further. Manifestly to start the foot column moving at such an early hour that it will be forced to await the clearing of CR 601 would be absurd. The time to start these marching troops will be such that the column will not interfere with the troops moving across our front. That is, they should not reach CR 601 before 3:00 AM. This allows a saftey factor of 15 minutes.

We will plot this in on the graph. (See Figure 22, Serial 3.) Note that this serial meets the returning motor column at CR 601. At this point the foot troops are loaded. This takes some time, as the graph (Figure 23) shows. Then the motor transport column starts for the new bivouac. Figure 23 shows the loaded returning motor column (3a) and also that the column arrives within the new bivouac area prior to 6:00 AM as required by the terms of the problem. In short, by a combination of marching and motor transport it is possible to solve this problem which is essentially simple, though at first glance it looks complicated.

Figure 23 is the completed march graph which is needed in order to solve this problem. Without a march graph, think of the arithmetical calculations or even algebraic equations that would be necessary to calculate just where the motor column with one speed and coming from one direction, and the foot troops with a different speed and marching from an opposite direction would meet. In this situation the problem is made simple by

bringing both units up to CR 601 at the time when the road block is cleared. However, this will not happen in all problems. Where a motor column makes two round

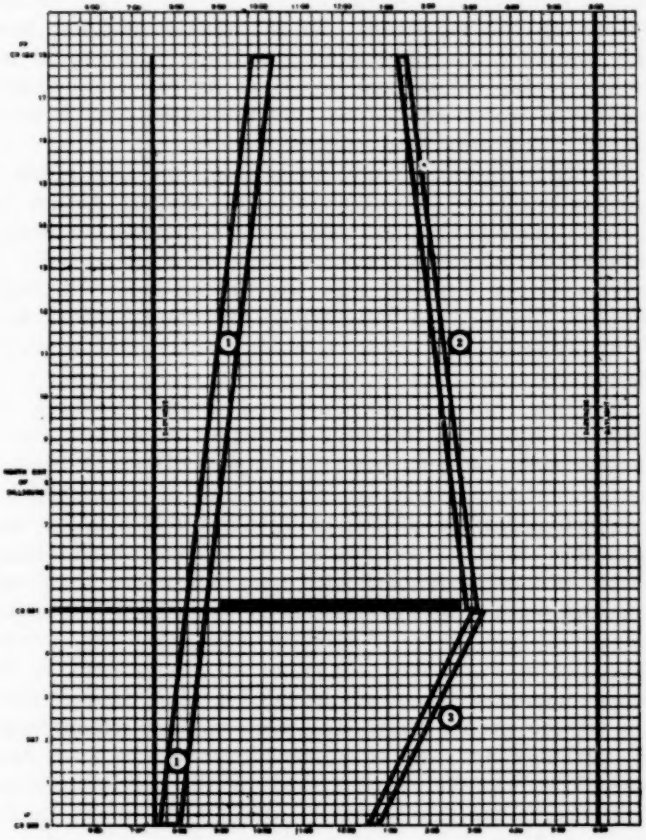

FIGURE 22.—Third serial plotted in.

trips, for instance, the matter becomes quite complicated, for several serials will be moving by marching and unless a march graph is used serious snarls are likely to occur.

Usually to expedite movements it is better to halt the truck train short of the new bivouac, detruck, and march the troops on foot into the new bivouac area while the trucks turn around and return for another load of troops who are marching toward the new bivouac. This method speeds up the movement. In the case considered here, this was not advisable since the truck train could not return to the old bivouac for some hours. There was a barrier to troops at CR 601 that prevented such a move, which is the usual and normal method.

So far in this discussion an attempt has been made to portray some of the difficulties of moving troops by motors—such as, limited time, limited priority on routes, insufficient number of trucks, and the requirements of secrecy which require that the trucks move at night without lights. The discussion, therefore, shows how shuttling may solve neatly a problem that could be solved in no other way.

However, the tale does not end there. Probably the greatest difficulties one will encounter in such a movement cannot be put down on paper. These difficulties pertain to the maintenance and servicing of motor vehicles. Efficient operation of trucks requires organization and planning ahead. This means that qualified maintenance crews, properly equipped with tools and spare parts and provided with transportation, must accompany the motor column at all times. Necessary equipment for towing must not be overlooked. Gasoline, oil, and grease, in the proper quantity, must be provided at the desired place and at the proper time. The necessary equipment must be available and the arrangements must be such that reservicing can be accomplished in the minimum time.

In short, the finest graphs and march tables in the world will be useless unless the practical difficulties of motor movements are ever kept in mind. It is easier to graph and chart a movement than to make one.

But the construction of the graph is not the end of the matter. It must be realized that the reason for

constructing a graph of a movement, such as has been discussed, is to enable the commander to visualize the entire movement, and to provide a basis for issuing orders

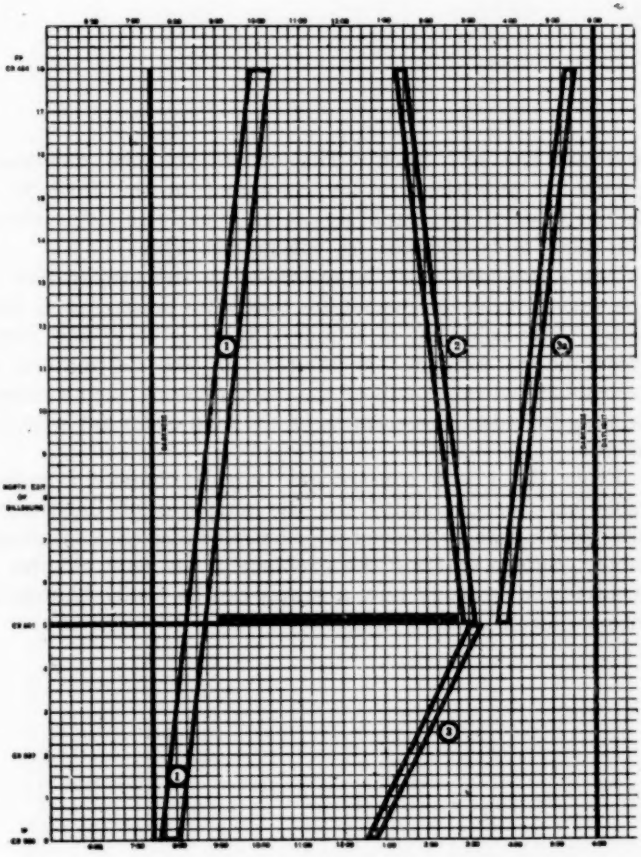

FIGURE 23.—Completed march graph.

to the component parts of the command for the movement. The construction of the graph of a movement is essentially a staff function and is the means to an end

and not the end itself. The orders for the movement should be published to the command in the form of a march table. The graph serves as a basis in determining the facts to be included in the march table.

The same care must be exercised in the preparation of the march table as would be taken in preparing a field order. The acid test of a march table is this: can serial commanders conduct the march to the destination in accordance with the will of the commander? Such a march table is included as an annex of the field order for a movement.

From the graph constructed in this chapter a march table has been compiled for the purposes of illustrating how graph data is entered on a march table (See following table). Before starting the problem in the next chapter it is advisable to study how a graph can be easily translated into a march table.

MARCH TABLE

MAPS: U.S. Geological Survey 1.62,500
CARLISLE Quadrangle

1st INF
YORK SPRINGS, PA.
8 Feb. 37, 7:30 AM

Serial No.	Organization	Present Location	Initial Point	Route	Location by hour movement is completed	REMARKS
1	Lt Col 901st Inf 1st Bn 901st Inf with 119 trucks 1st Inf with normal loads (attached)	Bivouac area at YORK SPRINGS	CR 589 (360-770)	CR 589—CLEAR-SPRING (365-775)—CR 601 (365-775)—DILLSBURG—LOCUST POINT (365-790)—CR 424 (365-795)	Bivouac area in the vicinity of HOGESTOWN PA (365-800)	Head of serial to pass IP at 7:35 PM, 8 Feb. Tail of serial to clear CR 601 before 9:00 PM. 114 trucks 1st Inf are released upon reaching new bivouac area . (1) (2)
2	Maj B 1st Inf 114 trucks 1st Inf	New bivouac area near HOGES-TOWN	CR 424	CR 424—LOCUST POINT—DILLSBURG—CR 601	CR 601	Return trip of 114 trucks prepared to carry foot elements. Head of serial to pass IP (CR 424) at 1:15 AM, 9 Feb., and to pass CR 601 after 2:45 AM and before 3:00 AM, 9 Feb. Trucks are attached to Serial No 3 upon reaching CR 601. (1) (2)
3	Lt Col C 1st Inf Foot elements 1st Inf (114 trucks attached at CR 601)	Bivouac area at YORK SPRINGS	CR 589	Same as for Serial No. 1	Bivouac area in the vicinity of HOGESTOWN	Head of serial to pass IP at 12:30 AM, 9 Feb. Head of serial to arrive at CR 601 after 2:45 AM and before 3:15 A M,9 Feb. 114 trucks attached at CR 601. Movement to be completed in attached trucks. Tail of serial to clear CR 424 before 5:45 AM, 9 Feb. (1) (2)

(1) A troop column has priority over this command at CR 601 from 9:00 PM, 8 Feb. to 2:45 AM, 9 Feb.
(2) No lights will be used.

By order of Col 1st Inf:

"S-3"
Maj Inf
S-3

"Executive Officer"
Lt Col. Inf
Ex O

TABLE I

PERSONNEL NOT PROVIDED WITH ORGANIC TRANSPORTATION

UNIT	With packs and individual equipment		
	No.* (see note)	No. of trucks required	
		1½-ton	2½-ton
Rifle Battalion	509	34	17
Bn Hq & Hq Det (R)	8	1	1
Rifle Co	167	12	6
Rifle Plat	51	4	2
Regtl Hq & Hq Co & Band	96	7	4
Infantry Regiment	1623	109	55
Infantry Brigade (less 1 Regt)	1667	112	56
Infantry Brigade	3290	220	110

Organizations not shown move by unit motor transportation.

*Number of officers and men in the regiment for which no organic transportation is provided.

TABLE II

ROAD SPACE AND TIME CALCULATION

1. *ROAD SPACE CALCULATIONS.*—

a. Average road space per truck:

(1) March rate at 5 to 15 miles per hour.....35 yards
March rate at 16 to 25 miles per hour....50 yards

(2) Parked for entrucking or detrucking operations .....11 yards

b. Use 48 trucks per company for all quartermaster companies (truck).

2. *TIME CALCULATIONS.*—

a. Time required for loading and unloading:

	To Load	*To Unload*
Personnel only	15 minutes	10 minutes
Materiel or animals or both, and personnel	30 minutes	15 minutes

b. After receipt of orders to move troops, the time required to place motor transport in condition to leave the location at which it receives its orders is as follows:

Trucks empty .....15 minutes
Trucks loaded with supplies .....1 hour

TABLE III

ROAD SPACES FOR UNITS OF INFANTRY DIVISION AND ATTACHED UNITS, IN YARDS, (W/S)

UNITS	Tables of Organization	Personnel No. of Officers and Men	ROAD SPACES								
			Troops		Combat Trains Motorized	Troops and Combat Trains		Field Trains Motorized	Troops, Combat & Field Trains		Service Trains Motorized
			Foot Sections	Motorized Sections		Foot Sections	Motorized Sections		Foot Sections	Motorized Sections	
INFANTRY											
R Co Inf Regt		167	85		25	85	25		85	25	
Hq & Hq Det R Bn		26	10	75	25	10	100		10	100	
Total R Bn		527	265	75	110	265	185	265	265	450	
MG Co 30 Cal Inf Regt		110		350			350			350	
Plat MG Co 50 Cal Inf Regt		42		135			135			135	
MG Co 50 Cal Inf Regt		152		485			485			485	
Plat Mortar Co Inf Regt		30		110			110			110	
Mortar Co Inf Regt		114		380			380			380	
Hq & Hq Det SW Bn Inf Regt		30		95			95			95	
TOTAL SW Bn Inf Regt		626		2210	25		2235	370		2605	
Serv Co Inf Regt		163						1790		1790	
Hq Hq Co & Band Inf Regt		198	55	715	25	55	740	110	55	850	
TOTAL Inf Regt		2568	950	3250	385	950	3630	1790	950	5470	
Hq & Hq Co Inf Brig		98	20	405		20	405		20	405	
TOTAL INF BRIG		5234	1980	6955	770	1980	7765	3630	1980	11445	

TABLE IV

TRUCKS AVAILABLE IN INFANTRY REGIMENT

Combat train trucks		14
Field train trucks—		
Baggage	21	
Gas in containers	3	
Water in containers	5	
Ration and kitchen	20	
Total field train trucks		49
Hq. Co. trucks (Co. trains)		7
Total		70
Co. trains of regimental motorized units (less Hq. Co.)		49
Total		119

CHAPTER 10

Motor Shuttling of a Reinforced Regiment

(INFANTRY SCHOOL TEACHING)

ILLUSTRATIVE PROBLEM

1. *SITUATION.—a.* Situation map herewith. (See Figure 24, in pocket in back of book).

b. The 1st Infantry with the 1st Battalion 1st Field Artillery, 75-mm gun (horse-drawn) attached, is bivouacked west and southwest of Leetown (280-690) as shown on the situation map.

This force has been ordered to move during the night 5-6 November to a bivouac area west of Zittlestown (310-705) (see situation map).

The movement is to be made under cover of darkness via the road: (see situation map) road junction approximately 0.4 mile southwest of Leetown—Leetown—Kerneysville (285-695)—Shepherdstown (295-700)—Sharpsburg (300-700)—Porterstown (300-705)—CR 471 (305-705)—RJ 415 (305-705)—RJ 494 (305-705) (western apex of road triangle).

All movement toward the new bivouac area (northeastward) will be without lights. Lights may be used on motor vehicles moving toward the old bivouac area (southwestward).

Movement off of the route of march may be made only for the purpose of turning around (reversing) a motor column.

No movement out of present unit bivouac areas will be permitted prior to darkness (6:00 PM) 5 November.

All elements must be within the general bivouac area west of Zittlestown by daylight (5:40 AM) 6 November.

Troop columns, moving northward through Sharpsburg via the Harper's Ferry Road and the Hagerstown Pike have priority at the eastern cross street in Sharpsburg during the following periods:

From 7:40 PM to 9:30 PM 5 November.

From 1:00 AM to 4:15 AM 6 November.

(see situation map.)

c. Colonel 1st Infantry has announced the following:

The march will be made by serials moving at normal average rates of travel.

No double banking or passing of columns in either direction will be permitted except within the bivouac areas, i.e., the route of march will be used as a one-track road.

Vehicles of the regimental (organic) transportation (total 114, 1½-ton trucks) may be employed in the transportation of foot elements by shuttling.

Motor vehicles other than 1½-ton trucks will be moved as directed by the commanders concerned in such manner as not to interfere with the march as ordered.

In view of the limited time available, lights will be used in movements toward the old bivouac area (southwestward) by motor columns.

d. You are S-3 1st Infantry. Colonel 1st Infantry has directed you to make calculations and to show by a graph, your recommendations for conducting the march of the 1st Infantry with the 1st Battalion 1st Field Artillery attached.

You have made a reconnaissance of the route of march and have determined the following:

All roads shown on the situation map along the route of march are suitable for motor transportation.

Available turn-arounds are as indicated by the road net.

The distance by road from the road junction approxi-

mately 0.4 mile southwest of Leetown to the eastern cross street in Sharpsburg is 13 3/4 miles, and the distance from this cross street in Sharpsburg to RJ 494 (the western road junction in the new bivouac area) is 5¼ miles.

All other distances are as shown on the situation map.

e. In addition to the above, you know the following:

The loading of foot elements into trucks requires 15 minutes and the unloading 10 minutes.

After the tail of a column clears into either bivouac area one hour will be required for unloading or for loading normal loads before the head of the column can leave the bivouac area.

The time required by a truck column for turning around outside of bivouac areas will be that needed to travel the distance in any turn-around chosen, at a rate of 8 miles per hour.

The average road space per truck at rates between 5 and 15 miles per hour is 35 yards, and at rates between 16 and 25 miles per hour is 50 yards.

There are 119 1½-ton trucks in the 1st Infantry.

There are no 1½-ton trucks in the 1st Battalion 1st Field Artillery.

FIRST REQUIREMENT

2. Show by graph your recommendations for accomplishing this movement.

NOTES

a. Use space between heavy lines on cross section paper to represent 1 mile of distance and 1 hour of time.

b. Use tables in preceding chapter for obtaining any other data desired.

3. *SITUATION, CONTINUED.*—Your recommendations for the conduct of the march, as shown by your march graph, were approved by Colonel 1st Infantry and he has directed you to submit recommendations for a march table to be used as an annex to the regimental field order directing the movement.

SECOND REQUIREMENT

4. Submit a march table based on the graph.

NOTES

1. 1st Bn 1st FA (75-mm, horse drawn) (less motor vehicles)

Rate	3 MPH
Road Space	2690 Yds
Time Length	31 Mins
Distance	19 Miles
Time Distance	6 Hrs 20 Mins
Head of Column Passes IP	6:20 PM
Arrives, New Bivouac	12:40 AM

2. Foot elements, 1st Inf. transported in 114 1½-ton Trucks

Rate	8 MPH
Road Space	3990 Yds
Time Length	17 Mins
Distance	13¾ miles
Time Distance	1 Hr 44 Mins
Head of Column Passes IP	9:55 PM
Arrives, Sharpsburg	11:39 PM

2a. Foot elements, 1st Inf. (on foot) (3 rifle bns Regtl Hq Co and Band)

Rate	2 MPH
Road Space	950 Yds
Time Length	17 Mins
Distance	5¼ Miles
Time Distance	2 Hrs 38 Mins
Head of Column Passes Eastern Cross Street in Sharpsburg	12:15 AM
Arrives, New Bivouac	2:53 AM

3. 114 1½-ton trucks (empty) return to old bivouac

Rate	20 MPH
Road Space	5700 Yds
Time Length	10 Mins
Time Distance in Turn-around: 0.4 miles at 8 mph	3 Mins
Distance (13.75—0.15)	13.6 Miles
Time Distance	41 Mins
Head of Column Passes Center Square in Sharpsburg	12:20 AM
Arrives, Old Bivouac	1:01 AM

4. 119 1½-ton trucks carrying normal loads

Rate	8 MPH
Road Space	4165 Yds
Time Length	18 Mins
Distance	19 Miles
Time Distance	2 Hrs 23 Mins
Head of Column Passes IP	2:45 AM
Arrives, New Bivouac	5:08 AM
Tail Clears RJ 494 (in New Bivouac)	5:26 AM

A SOLUTION TO THE FIRST REQUIREMENT

5. See march graph herewith. (Figure 25).

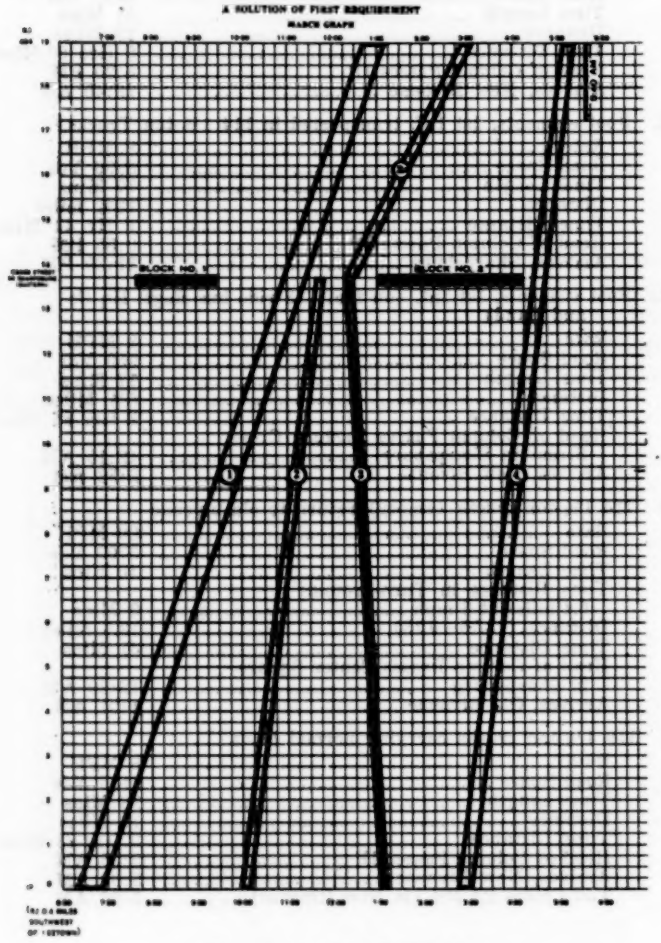

FIGURE 25.—March Graph.

A SOLUTION TO THE SECOND REQUIREMENT

6. See march table herewith. (Table I).

TABLE I

MAPS: U.S. Geological Survey 1:62,500
MARTINSBURG and ANTIETAM Quadrangles

ANNEX No. 1 to FO No. 10

MARCH TABLE

1st INF
SW LEETOWN, VA
5 Nov 37, 7:00 AM

Serial No.	Organization	Present Location	Initial Point	Route	Location by hour movement is completed	Remarks
1	1st Bn 1st FA (less motors)	Bivouac area SW LEE-TOWN	RJ 0.4 miles SW LEE-TOWN	LEETOWN SHEPHERDSTOWN —SHARPSBURG— PORTERSTOWN— CR 471 (305-705)— RJ 415 (305-705)— RJ 494 (305-705)	Bivouac area west of ZITTLES-TOWN	Head of serial to pass IP at 6:20 PM, 5 Nov. Tail of serial to clear SHARPSBURG prior to 11:35 PM, 5 Nov. (1)
2	Lt Col B. Foot elements 1st Inf with 114 1½-ton trucks attached (49 from 4th Bn, 58 from Serv Co, & 7 from Regtl Hq Co 1st Inf)	Same	Same	Same	Same	Head of serial to pass IP at 9:55 PM, 5 Nov. Head of serial arrives at east cross street in SHARPSBURG after 11:35 PM and before 12:00 midnight, 5-6 Nov. Troops detrucking in SHARPSBURG and continue march on foot, clearing SHARPSBURG prior to 12:55 AM, 6 Nov. Trucks are released in SHARPSBURG. (1) (2)
3	Maj C 114 1½-ton trucks	Eastern cross street thru SHARPS-BURG	Center square in SHARPS-BURG	SHARPSBURG— SHEPHERDSTOWN —LEETOWN— old bivouac	Bivouac SW LEETOWN	Return trip of empty trucks. Tail of serial will clear IP prior to 12:50 AM, 6 Nov., and will clear into old bivouac SW LEETOWN prior to 1:45 AM, 6 Nov. Upon arrival in old bivouac trucks revert to their units. (1) (2)
4	Lt Col D. 119 1½-ton trucks with normal loads	Bivouac area SW LEE-TOWN	RJ 0.4 miles SW LEE-TOWN	Same as Serial 1	Same as Serial 1	Head of serial to pass IP at 2:45 AM, 6 Nov. Tail of serial to clear RJ 494 prior to 5:40 AM, 6 Nov. (1) (2)

(1) Troop columns moving north via east cross street through SHARPSBURG have priority from 7:40 PM to 9:30 PM, 5 Nov and from 1:00 AM to 4:15 AM, 6 Nov.

(2) Lights will not be used in movements toward the new bivouac area. Lights will be used on return trip toward old bivouac area.

By order of Col 1st Inf:

"S-3"
Major Inf
S-3

"Executive Officer"
Lt Col, Inf
Ex O

A DISCUSSION

7. *PURPOSE.*—The problem illustrates the use of a graph in making the calculations that are necessary to enable the commander of a reinforced regiment of infantry to coordinate the movement of his command, by serials and by use of the shuttling method, in a situation in which no hostile interference is anticipated but in which time and roads are limited; it also shows the application of the calculations to a march table.

8. *NECESSITY FOR CALCULATIONS.*—The mission of Colonel 1st Infantry is that of moving his command from the present bivouac area, by the use of one road, to a new bivouac area, all movement to be accomplished between stated hours and so as to avoid interference with two other columns that block the road at a given point between certain hours.

Since to clear Sharpsburg (13 3/4 miles distant) foot elements (at 2 miles per hour) will require 7 hours and 10 minutes, it is apparent that if marched at 6:00 PM (the earlist hour) they would not clear the block until (6:00 PM + 7 hrs 10 mins) 1:10 AM, or 10 minutes after block No. 2 begins. Therefore, foot elements, maintaining the normal rate, may not be sent on foot before the blocks. Since after block No. 2 there remains 5¼ miles to be traveled in 1 hour and 25 minutes, remaining time, it is also apparent that foot elements cannot be marched on foot after block No. 2 ends. Therefore, the foot elements cannot be marched as a foot serial all the way. Because of this and in order to conserve the energy of his foot elements, Colonel 1st Infantry authorized the use of regimental transportation for moving foot elements.

Before Colonel 1st Infantry can issue his orders directing the time of departure and other coordinating details,

concerning these serials, he must be sure that such orders are capable of being accomplished without violating orders from higher authority and without mutual interference between serials. To insure this, certain calculations must be made. These calculations he directs S-3 to make and submit in the form of a graph.

9. *REGIMENTAL S-3's TASK.*—From information previously gained and by calculations, S-3 determined the time lengths of each proposed serial, the road distances and time distances involved, and other necessary data.

In order to evalute this data and make it readily available he must record it in intelligible form. For this purpose he uses a work sheet or computation sheet, and applies the data to a march graph. (The data necessary in this situation is included in a table in order to facilitate the work of the student in preparing the graph.)

After preparing the cross-section paper with a vertical scale of distances and a horizontal scale of time, he plots: the initial point, the final point, the location and hours of the blocks, and the hour at which the march must be completed. He then applies to the graph, various arrangements of proposed serials until he finds a suitable solution.

In this situation he finds from the graph the following:

Foot elements cannot be marched on foot all the way.

No serial can be sent before block No. 1.

The 1st Battalion 1st Field Artillery cannot be sent after block No. 2, and therefore must be sent between the blocks.

Some trucks must make three one-way trips or partial trips between bivouacs. If a motor serial is sent ahead of the 1st Battalion 1st Field Artillery it cannot return before block No. 2 begins, except by passing columns, which is prohibited. After block No. 2 ends there is sufficient time for only one one-way trip between bivouacs. Therefore, a motor serial must be sent after the 1st Battalion 1st Field Artillery and before block No. 2. A motor serial sent after the 1st battalion 1st Field Artillery would not have

sufficient time to go all the way to the new bivouac and return before block No. 2 begins. But such a serial could reach Sharpsburg, unload foot elements, and return to the old bivouac area with plenty of time remaining to load normal loads and make the final trip to the new bivouac area; this after block No. 2 ends and before the hour at which the march must be completed.

From this analysis he obtains the march graph.

10. *MARCH TABLE.*—The calculations made as outlined in the preceding paragraph form the basis for orders to the command. Upon completion of these calculations the next step is the order for the movement. Where a march table is used it constitutes a part of the field order directing the march. Every entry made in the march table is an order to the command. The wording should be concise and the meaning unmistakably clear. In general, the march table should contain sufficient data to coordinate the movement of the serials and insure the conduct of the march in accordance with the will of the commander.

CHAPTER 11

Cavalry With Infantry

(INFANTRY SCHOOL TEACHING)

Cavalry will be attached to infantry when the need for such attachment exists and cavalry can be spared from other missions. The infantry commander who thus has cavalry available to him then becomes responsible for its employment. However, to use his cavalry properly he need not be trained technically as a cavalryman, but he must know the powers, limitations, and characteristics of the arm and he should be familiar with the missions which cavalry is peculiarly fitted to perform.

It is the purpose of this chapter to explain the nature of cavalry from an infantry commander's viewpoint; to discuss the selections of cavalry missions and to outline a method for the control of cavalry when it is attached to infantry. This knowledge is essential to the commander who would use attached cavalry properly.

Cavalry exists because it combines mobility, both tactical and strategical, with fighting power. For centuries cavalry derived its mobility from the use of the horse, but recently the armored self-propelled fighting vehicle has been utilized in the horse regiment as a supplement, and in the mechanized regiment, as a substitute for the horse. There are then, two types of cavalry, horse and mechanized, and the organization of the arm comprises both horse regiments and mechanized regiments. It should be noted that while the mechanized regiment has no horses whatever, the horse regiments have small mechanized components.

The mobility of horse cavalry, exclusive of its mecha-

nized elements, is a variable which depends on the training and condition of the personnel and animals. It may march distances of from 30 to 40 miles per day without excessive fatigue. By its maximum effort it may march 100 miles in 24 hours. Its marching rate is around 5½ miles per hour but for short distances it may greatly exceed this. For example, a tactical movement of ten miles may be made in as little as one hour. While the speed or distance of horse cavalry movement does not compare favorably with mechanized units, horse cavalry can negotiate rough country better than any other troops except infantry. The adverse effect of unfavorable conditions of weather or terrain on the mobility of horse cavalry is relatively slight, although these factors may have a definite effect on the ultimate condition of the command. Since all its essential combat elements and equipment are carried on the backs of horses, horse cavalry is not dependent on roads.

The organization of horse cavalry is built around the mounted trooper armed with the rifle and pistol. To support him are light and heavy machine guns and antitank guns, all carried in pack. A platoon of ten scout cars is included in each regiment. These fighting vehicles serve to extend the radius of action of the horse regiments, to enhance their usefulness, and to save their horse-flesh by taking over much of the long distance patrolling.

The mechanized cavalry regiment consists of several types of fighting vehicles. The basic vehicle is the combat car which is very similar to the light fast tank of the infantry. To provide fire support for the movement of the combat cars, the regiment has a machine-gun troop transported in cross-country carriers. Smoke for the purpose of blinding hostile antitank guns is provided by a mortar platoon. The long distance reconnaissance and security functions are largely performed by the armored car troop. A summary of the fighting vehicles shows 56 combat cars, 21 armored cars, 23 personnel carriers, and 6 mortar mounts in the regiment.

Organically the essential difference between mechanized cavalry and light tank units of the infantry lies in the in-

clusion of reconnaissance and supporting fire units in the mechanized cavalry. By virtue of its organic reconnaissance and fire support units, mechanized cavalry is capable of independent operation up to the full range of its radius of action. Infantry light tanks, while mechanically capable of the same speed and radius of action as mechanized cavalry, have for their primary mission the direct assistance of infantry. Their fire support and reconnaissance must come from the infantry and its supporting arms. Accordingly, their use on independent missions beyond the support of other troops is exceptional, such missions being the proper province of mechanized cavalry.

Mechanized cavalry may march 150 miles a day. Of course, to do so it must avail itself of roads, for although it has power to move across country, such operations greatly lower its strategical mobility. To attain its full range of action, it must rely on roads to a great extent; therefore, it is very "road-sensitive." The combat of mechanized cavalry may be characterized by the supported assault of its combat cars against a given objective, or it may act by fire alone, placing the vehicles in favorable positions from which such fire can be delivered. Compared to horse cavalry, mechanized cavalry has, under favorable conditions, greater powers, and under unfavorable conditions, greater limitations.

Since the possible range of action of mechanized cavalry is far beyond the range of action or the area of interest of small infantry units, it will be seldom that the cavalry attached to such infantry commands will come from mechanized cavalry units. The infantry commander who has cavalry available will, therefore, be concerned with horse cavalry, including the organic mechanization (scout and armored cars) of such cavalry.

Infantry units smaller than a regiment seldom will have cavalry attached. Suitable attachments for larger units might be:

For an infantry regiment—from a cavalry platoon to a troop.

For an infantry brigade —from a cavalry platoon to a squadron.
For a division —from a cavalry troop to a regiment.

In each of the above cases, it should be understood that the cavalry elements may have suitable reinforcements such as machine guns, scout cars, communication and supply personnel and equipment.

The inherent characteristics of cavalry—mobility and fighting power—naturally suggest the missions for which it is best suited. These missions taken together comprise the role of cavalry. They include:

Reconnaissance
Denying hostile reconnaissance
Security, including security against hostile mechanization
Cooperation with other forces in battle
Exploiting a success
Covering a withdrawal
Filling a gap
Mobile reserve
Connecting, or liaison missions
Delaying actions
Seizing ground in advance of slower troops.

The commander of the infantry force to which cavalry is attached is charged with the tactical employment of the entire force. As an infantryman he will be concerned with the technical employment of his infantry. The cavalry, however, will have its own commander who is charged with these functions, so far as the cavalry is concerned. The infantry commander, therefore, should limit himself to asigning missions to his attached cavalry, leaving to the cavalry commander the task of carrying them out. Of course, there may be exceptions to this principle, but they must be justified by the special circumstances of each case. For our purpose and in general we may say: The orders of the infantry commander to his attached cavalry should be in the form of a statement of missions to be executed, the

method of execution being left to the discretion of the cavalry commander.

It follows that the selection of the mission given the attached cavalry will determine, to a considerable extent, its usefulness to the entire force. In other words, the skill of an infantry commander in handling his attached cavalry will be measured largely by the soundness of the missions he calls on the cavalry to perform.

In determining what the cavalry mission should be, the commander must keep the mission of the force as a whole clearly in his mind. The efforts of the cavalry should be so directed that they render the maximum assistance in accomplishing the mission of the entire command. Thus, the cavalry might perform brilliant and, in a sense, highly successful roles, but if, in so doing, the accomplishment of the mission of the whole command were not forwarded, the cavalry's efforts would be wasted.

This is such a highly important point that one would think it would seldom be forgotten. Yet history is replete with examples where it has been forgotten or overlooked and disaster followed. Hooker devised a brilliant scheme of maneuver to open the campaign of Chancellorsville and executed it with consummate skill. But he made a fatal mistake by sending Stoneman with 10,000 sabers on a long raid against Lee's communications. Thus, they were not present when battle developed from Hooker's maneuver. True, Stoneman accomplished his mission; for Stuart, the Confederate cavalry leader, let him go on his way. Meanwhile, Stuart's troopers were used to render the maximum assistance to Lee in gathering intelligence and blinding the Union army. Hooker's artful scheme of maneuver reached its climax in the bloody battle around Chancellorsville, and there the magnificent and numerically superior Union army met a stunning defeat. True, one cannot attribute the defeat wholly to the improper use of cavalry, but it was a great and often unappreciated factor in the Union repulse.

Just a short time later during the Gettysburg campaign, Stuart was off on a cavalry expedition, and Lee was with-

out his eyes and ears for many days. When Stuart finally turned up the battle of Gettysburg was on its way. True, Stuart had captured a wagon train and brought it to Lee, but the prior information Lee badly needed to plan his battle was never gathered. Stuart was not present to take the orders of his commander and gather the essential information.

Certainly, it was quite all right for cavalry to capture wagon trains, but there is always grimmer business afoot prior to the clash of a great battle. Stuart here failed to "render the maximum assistance in accomplishing the mission of the entire command." We are not trying to settle the responsibility for this matter now. We only wish to point out this—an odd thing: the Confederates who understood so well how to utilize cavalry and who had recently witnessed Hooker's error in handling cavalry during the Chancellorsville campaign repeated the very same error when making their supreme effort of the war. This should give us pause, for when the proven soldier is likely to have mental lapses and fail to carry out a certain function properly, it indicates that here we have one of those small things, plainly apparent but easily overlooked, and that so often ruin a great enterprise.

From all this we can say confidently that the understanding of the function of cavalry operating with infantry begins with this: *The mission given the attached cavalry should be the one which, if accomplished, will do most to insure the attainment of the mission of the force as a whole.*

It should be noted that the above statement is qualified by the phrase "if accomplished." There might be numerous missions, whose accomplishment by the cavalry would help to insure the attainment of the mission of the larger unit to which the cavalry is assigned. However, if the cavalry is unsuccessful because of its unsuitability or inadequacy for the task assigned, its efforts, as an aid in carrying out the mission of the command, will be wasted.

This leads to two more requirements of a proper cavalry mission:

The mission should be suited to the special characteristics of cavalry,

and

The mission should be within the power of the attached cavalry unit to accomplish.

To sum up, the usefulness of the attached cavalry will depend largely on the careful selection of the task assigned it by the infantry commander. In making this selection he should confine himself to a mission only, not specifying how the mission is to be accomplished. The mission so selected should be the one which will do most to insure the accomplishment of the mission of the force as a whole; it should be suited to the special characteristics of cavalry; and it should be within the power of the cavalry to perform.

When more than one cavalry mission is given, the order of importance should be indicated. This may be done by a simple statement of the relative importance of the missions or instructions as to the sequence in which they will be undertaken.

Since the commander of the attached cavalry is also the staff officer for cavalry on the staff of the commander of the entire force, his recommendations should be obtained in regard to the employment of the cavalry. But it must be understood that the proper employment of the attached cavalry is a responsibility of the infantry commander. Faulty advice by the cavalry commander does not excuse faulty employment of the attached cavalry. The principal function of the cavalry commander is the execution of missions assigned him by the commander of the force to which attached.

When cavalry is attached to infantry a need for specific liaison measures is created, since the cavalry command post will seldom be at or near the command post of the infantry.

This liaison should extend from the infantry to the cavalry and from the cavalry to the infantry. The former

may be satisfied by occasional liaison visits, but the liaison from the cavalry to the infantry may well be continuous, and is maintained best by the continued presence of cavalry liaison personnel at the proper infantry command post.

The cavalry liaison personnel should include sufficient means of communication (normally provided by the cavalry) to insure keeping close touch with the cavalry commander as the situation may require. With changes in the situation, the amount and type of communications personnel and equipment may change.

This problem of liaison between the infantry and its attached cavalry may be solved in other ways. The important point to remember is that, when cavalry is attached to infantry, some definite measures must be taken to effect adequate liaison between the two.

Horse cavalry is still with us. It has important functions to perform. Cavalry can prove of vital assistance to the infantry commander; therefore, it is imperative that all infantry commanders understand its powers and limitations so that they can articulate it with the infantry in the performance of tactical missions.

CHAPTER 12

Machine Gun Indirect Laying Using An Aerial Photograph

(INFANTRY SCHOOL STUDY)

The wide uses to which an aerial photograph can be put are not always fully realized. As a matter of fact, and contrary to general opinion, these photographs can be used for such precise work as the indirect laying of machine guns. Furthermore, except for the elevations shown on fire control maps, aerial photographs are more accurate than a fire control map. With such a photograph and a map from which elevations can be obtained, but which is unfitted for firing purposes, it is possible to do all around excellent work. For instance, by using a one-inch-to-the-mile contoured map—which by itself is not adequate for fire control purposes—and an aerial photograph, complete firing data can be computed which will give excellent results. The map is used only for determining vertical intervals. However, in long-range indirect fire, which is never upon a *point* but always upon an *area target*, oftentimes the vertical interval may be disregarded. In such cases the photograph alone is all that is needed to calculate data; of this, more later.

It must not be thought that this use of airplane photographs for indirect laying is a make-shift only to be used when all other methods fail. Not at all; as a matter of fact, it is a rapid, precise method and it may become more common than firing from a map, for in wartime, fire con-

trol maps for all areas are not likely to be easily obtainable.

Although the technique of photograph firing is still in the development stage, problems worked wholly on an airplane photograph have been fired at The Infantry School with excellent results—fully equal to those where data was obtained with instruments. The following problem is similar to those fired at The School.

SITUATION

The Blue 1st Division is engaged in the defense of a position. Hostile attacks have developed such strength that all of the firepower of the division is required to maintain the defense. Company D 1st Infantry is part of the division reserve and a fire mission has been assigned for each platoon in support of one of the front-line regiments. Lieutenant 1st Platoon Company D, at the company command post, has just received the following verbal instructions from the company commander:

"No fire control maps are available. Your target area is not visible from our own front line, but here is an aerial photograph which shows the target and our position. (See Figure 26.) We are at point *X*. The reconnaissance officer has marked a position for your No. 1 gun at point *A*, the end of a narrow strip of plowed ground.

"Your task is to interdict the edge of the woods from point *D* to point *E* both inclusive.

"Put your platoon in position. Complete your data from this photograph and let me know as soon as you are ready to fire."

REQUIREMENT

The actions of Lieutenant 1st Platoon Company D and the computation of the fire data for his platoon.

FIGURE 26.—Airplane photograph showing gun positions and target.

A SOLUTION

Lieutenant 1st Platoon, accompanied by his platoon sergeant, instrument corporal, and a runner, proceeds to point *A*. The narrow strip of plowed ground referred to by the company commander shows plainly in the aerial photograph, where it resembles a short section of road paralleling a narrow trail. Consequently point *A* is easily located on the ground. At this point Lieutenant 1st Platoon has a stake driven to mark the position of his No. 1 gun. With point *A* marked accurately both on the ground and photograph, he then locates a position for his No. 4 gun, placing it at point *B* near a bend in the ravine which also shows plainly on the photograph. His next concern is to establish an initial aiming point.

He notes that the end of the plowed strip farthest distant from the location of his No. 1 gun is visible from the gun position. This point, *C*, also shows distinctly on the aerial photograph. He directs that an aiming stake be placed at point *C* to serve an as an I.A.P. (initial aiming point). He now has an initial aiming point accurately located both on the ground and on the photograph and his flank guns are located with equal accuracy. He sends the runner to guide the platoon to its firing position, while he proceeds to plot his firing data.

Working directly on the aerial photograph, he draws the lines G^1-IAP, G^4-IAP, G^1-Target, and G^4-Target, as shown in Figure 27.* With these lines established, he measures, on the photograph, the base angles for the No. 1 gun and No. 4 gun with a machine-gun protractor, exactly as he would have done in plotting any indirect laying problem. They are L920 and L1148 mils, respectively. Therefore, if the No. 1 gun and No. 4 gun are aimed accurately at the initial aiming point and then swung through their respective base angles, they will be pointed at the target. By interpolating, he computes the base angles for the interior guns. He now has the necessary data to lay his guns for direction, but he has not yet solved the problem of range.

* In back pocket of book.

To determine the range, Lieutenant 1st Platoon measures the line G¹-Target. It is 7 inches. To convert this photographic distance into yards of range he turns to the representative fraction of the photograph which is indicated as 1/22,000.* This fraction tells him that one inch on the photograph equals 22,000 inches on the ground, and that—

$$\frac{\text{Photo Distance}}{\text{Ground Distance}} = \frac{1}{22{,}000}.$$

In this simple equation he substitutes the measured distance gun—target (7 inches) for the factor "Photo Distance" and writes down the following:

$$\frac{7 \text{ inches}}{\text{Ground Distance}} = \frac{1}{22{,}000 \text{ inches}}$$

$$\text{Ground Distance} \times 1 = 7 \times 22{,}000$$
$$\text{Ground Distance} = 154{,}000 \text{ inches}$$
$$= 4{,}278 \text{ yards (range, gun—target)}$$

In order to determine the correct quadrant elevation (QE) Lieutenant 1st Platoon must obtain the algebraic sum of the angle of elevation and the angle of site. His range table shows that the required angle of elevation for a range of 4,278 yards is 252 mils. But he has no means of determining the difference in elevation between the gun position and the target; consequently, he is unable to calculate the angle of site. However, his battery position is on a hill and a glance at the terrain in the vicinity tells him that in this rolling country the difference in elevation between the hills and the wooded valleys is rarely greater than 40 to 60 feet. At 4,000 yards a vertical difference of 60 feet between gun and target corresponds only to a five-

* If there is any question as to the accuracy of the representative fraction shown on the photograph—that is, the scale of the photograph—the platoon commander can readily determine the correct scale. All that need be done is to locate two points about an inch apart on the photograph and somewhere close to his position, accurately measure the distance between them on the photograph, and then measure or pace the distance between the same points on the ground. The representative fraction (scale) for the photograph is:

$$\frac{\text{distance in inches on the photograph}}{\text{distance in inches on the ground}}.$$

mil difference in elevation, and this difference is sufficient only to move the center of impact about 35 yards—not enough to cause him to miss his 100 by 200-yard target area.

Lieutenant 1st Platoon therefore decides to disregard the angle of site and to fire with a quadrant elevation corresponding only to the required angle of elevation, 252 mils. Since his plotted point is at the near edge of the target area he will partially compensate for any error which may result from disregarding the angle of site, if he requires his gunners to search up five mils during their traverse, thus insuring that a part of his beaten zone is always on the area. He now has sufficient data to fire and accomplish his mission. There remains the factor of troop safety, since the 1st Platoon must fire over the Blue front line.

Measuring on the aerial photograph the distance to the Blue front line, along the base line of the No. 1 gun, and finding it to be 5 inches, Lieutenant 1st Platoon applies the same formula which he used to determine the range to the target. Here are the figures from his scratch paper:

$$\frac{5 \text{ inches}}{\text{Ground Distance}} = \frac{1}{22{,}000 \text{ inches}}$$

$$\text{Ground Distance} \times 1 = 5 \times 22{,}000$$
$$\text{Ground Distance} = 110{,}000 \text{ inches}$$
$$= 3{,}055 \text{ yards (range to troops).}$$

The minimum angle of elevation for troop safety for a range of 3,055 yards is 182 mils. The difference between

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Let us say that the platoon commander decides to check the scale of the photograph by measuring the distance from A to C both on the photograph and on the ground. On the photograph it measures 0.83 inch; on the ground, 507 yards or 18,252 inches. Thus $\frac{0.83}{18{,}252}$ is the ratio of photo distance to ground distance. Dividing both numerator and denominator by 0.83 to get unity for the numerator, the platoon commander gets as his representative fraction: $\frac{1}{21{,}942}$. He may use this, then, as his representative fraction for further computation, although for practical purposes the scale shown on the photograph is close enough and probably as near correct.

this minimum safety angle and the quadrant elevation (252 mils) is so great that any reasonable difference in elevation between the gun and troops can be disregarded. However, where the front line is on high ground and the guns on low, it may be wise to check the difference in elevation using instruments.

Therefore, so far as the Blue front line is concerned, it is safe to fire. Friendly troops in rear of the front line will likewise be safe as the minimum angle of elevation for distances shorter than 3,055 yards will be even less than 182 mils.

Satisfied that he can fire with safety and having provided himself with necessary firing data, Lieutenant 1st Platoon estimates the windage correction to be applied to his guns. (Assume the wind to be 10 miles per hour from 3:00 o'clock.) Then while his guns complete their movement into position he completes his battery chart. It follows:

BATTERY CHART

A			TASK			
G[1]—Tgt.	G[1]— Tprs.	G — Mask		G —Tgt.	G — Tprs.	G — Mask
4278	*3055*		Rn.			
			V.I.			
			A.S.			
252	*182*		A.E.			
252	*182*		Q.E.			

I.A.P. .....*Stake*.....			Gun No.	Angles of Shift	Lay on Base Lines	
Base Angles	Lay on I.A.P Dial	Add			Dial	Add
L920	*L920*	*0*	1.			
L996	*L980*	*16*	2.			
L1072	*L1060*	*12*	3.			
L1148	*L1148*	*8*	4.			

BASE STAKES OUT		FIRE ORDERS	.....STAKES OUT	
Sight	*Right 13*		Sight	
Lay on Base Lines			Lay on	Stakes
Boxes per Gun	*12*		Boxes per Gun	
Quadrant	*252*		Quadrant	
Trav.	*L48*		Trav.	
Search UP	*5*		Search UP	
Rate	*M*		Rate	
Time	*on signal*		Time	

DISCUSSION

The aerial photograph offers a convenient and reliable source for the determination of indirect fire data. It is more accurate than the fire-control map, in the sense that the various terrain features appear in their exact relation to each other. Only on very irregular terrain and in large photographs are the edges of the picture distorted greatly enough to affect the fire. Moreover, an aerial photograph will usually be available, or can be obtained without much difficulty; whereas a fire-control map, particularly in hostile territory—well, there just won't be any.

The photograph has one disadvantage. It gives no information as to differences in elevation; consequently, the machine gunner must estimate site, or totally disregard it. As the problem shows, it is possible to disregard totally the angle of site, and still obtain very satisfactory results with long-range area fire. And it must be remembered that machine-gun fire by indirect methods is always area fire. However, if a map of any kind which shows differences in elevation is available, it can be used in conjunction with the aerial photograph to obtain indirect fire data which is very accurate indeed. For example, a geological survey map—by itself entirely unsuitable as a source for unobserved fire data—will give elevations accurately, and when this is combined with the data obtained from a good aerial photograph, the results can hardly be improved upon by the most accurate use of instruments.

The commander of a defending unit naturally desires to use all firepower of his automatic weapons to support his defense, while on the other hand he is anxious to keep the machine guns of reserve elements close enough to their own units to be immediately available when the critical moment arrives for their employment in the counter-

attack. Frequently these two desires cannot be realized at the same time unless some expedient is resorted to.

The use of the aerial photograph to provide data of sufficient accuracy for long-range indirect machine-gun fire seems to offer such an expedient.

[Editor's Note: Experiments with an airplane mosaic are now being conducted and look promising. A technique appears to be developing that will permit a rapidly assembled and uncontrolled mosaic to be used with good results for fire control purposes.]

CHAPTER 13

Preparing Mobilization Plans

(INFANTRY SCHOOL STUDY)

Mobilization of a unit is an intricate matter which depends, in a great measure, on the proper understanding of the mobilization problem by all commanders, staffs, and subordinate unit commanders. But this general understanding, by itself, is not enough. To insure a smooth mobilization a precise and definite mobilization plan is needed—a plan that contains few generalities and no vagueness.

To make such a plan, it must be recognized that mobilization is more than merely gathering all the men and equipment in one place ready to do something. It is a broad problem containing a multiplicity of factors that must be gauged and decided. Most of these factors can, and should, be studied beforehand, so that they can be outlined clearly, and clean-cut decisions reached. Finally, these decisions should be incorporated in a paper which is the mobilization plan. This plan should contain in *detail* the action required to accomplish mobilization. Nothing that can be foreseen should be left to chance or snap-decision during mobilization.

There is no prescribed form for a mobilization plan. Any form is satisfactory which covers all the details and insures the orderly response of all concerned. However, to prepare such a plan entails considerable work, since the responsible officers will find it necessary to make a thorough study of the War Department Protective Mobilization Plan, Corps Area Mobilization Plan, AR 120-10, AR 130-

10, and AR 330-5 (for National Guard), and Mobilization Regulations Nos. 1-1, 1-2, 2-1, and 3-1. Even then many details may be overlooked and not included, for it is not easy to take a great mass of generalized data and use it to cover a particular and practical problem. As a consequence, at the completion of the study of all the regulations concerned and the plan of the higher unit, there is no means of being assured that the subject has been completely covered.

In the following study an effort has been made to simplify the entire mobilization subject. It should be clearly understood that the method of attacking the problem is not the only one, and the type of mobilization plan developed is purely advisory and suggestive and not in any sense mandatory. However, it is believed that an approach to the problem such as outlined hereafter will produce simple and eminently workable mobilization plans—plans that will enable infantry units to mobilize smoothly and efficiently.

The fundamental idea is to have a *basic mobilization* plan prepared by the post or station headquarters and distributed to the subordinate units at that post. This plan will be based on the plan of a higher unit. To this basic plan each subordinate unit adds a *mobilization reminder*, or check list, which tells in detail what action is required of the various individuals of the unit in order to carry out the mission of the unit. Each headquarters on the post, in a like manner, receives a basic plan and prepares a mobilization reminder. These two items—*basic plan* and *mobilization* reminder—make a complete mobilization plan for any unit. The basic plan, with the added mobilization reminder, can be used for a post of any size whether it contains a number of units or only one. It is extremely flexible in its application.

Furthermore, this method of building mobilization plans can be easily applied to National Guard units by considering any locality where a National Guard unit is stationed as a post, even though only a company is in existence there. Where a National Guard regiment is stationed at one place,

regimental headquarters will prepare the plan and distribute it; a battalion at one place does the same thing. A company by itself will prepare its basic plan as well as the mobilization reminder. In any event, each station has a basic plan and a reminder for each headquarters and separate organization at the station in question. This last applies with equal force to the Regular Army also.

A further advantage of this method is the ease with which mobilization plans can be modified and kept up to date. Furthermore, it places squarely on the shoulders of the proper individual the type of work with which he is most concerned and for which he is personally responsible. In addition, it prevents the accumulation of a mass of plans which are in a large measure a repetition of the plans of the next higher unit or units. These plans, for the most part, serve no useful purpose in the mobilization of a minor unit and are very likely to confuse or even mystify the subordinate commander. The combination *basic plan* and *mobilization reminder* avoids duplication of work and concentrates all necessary work on the immediate problems within the purview of the commander or headquarters concerned.

The essence of this method of solving the mobilization problem is—it must be repeated—to prepare first a *basic mobilization plan* which will cover in detail all matters that should and can be handled by post headquarters in connection with the mobilization of all units at the post. This plan is furnished to subordinate units and then is supplemented by each unit with a *mobilization reminder* prepared by the unit commander, and which accompanies and becomes a part of the basic plan, in so far as that particular unit is concerned. There are then two separate documents which together give the detailed method for mobilizing the unit. *These two, taken together, are the unit mobilization plan.* Unit staffs receive basic plans and prepare mobilization reminders in the same manner.

To show how this method of preparing a mobilization plan can be utilized, it may be wise to construct such a plan step by step. As a consequence, we will consider first

how the basic mobilization plan for an organization might be prepared. It should be noted that the plan we are discussing is a post or station plan and as such it will apply to any post, whether it holds a company or a larger unit. Also, will be included as part of the plan the various appendixes and annexes required. Once this basic plan is out of the way the suggested topics to be included in mobilization reminders for the various echelons of the command will be discussed. The entire chapter, in order to cover the whole subject and its application to the National Guard and Regular Army, is divided into the following parts:

PART ONE—NATIONAL GUARD BASIC PLAN.—The suggestions furnished here for a Basic National Guard Mobilization Plan can be used by a single company at one station, or several companies at one station, or an entire regiment at one station.

PART TWO—NATIONAL GUARD MOBILIZATION REMINDERS.—a. Regimental commander and staff.—Applicable with modifications, to a battalion commander and staff or to the commander of any group of units at one station. The reminder, as noted before, will be used as an adjunct of the basic plan.

b. Company commander and personnel of company.—This reminder contains the list of individual duties to be performed by each member of the company to effect mobilization. It, also, is used as an adjunct to the basic plan.

PART THREE—REGULAR ARMY BASIC PLAN.—This plan is made up by a post commander to cover the mobilization of all units at his post.

PART FOUR—REGULAR ARMY MOBILIZATION REMINDERS.—a. Subordinate headquarters and staffs.—Similar to mobilization reminders for National Guard but modified to suit Regular Army and local conditions. (Mobilization reminders shown for the National Guard

can consequently be used as a guide for preparing the mobilization reminder of a Regular Army regimental commander and staff.)

b. Company reminder.—This subject is covered by furnishing a sample reminder which happens to be for a tank company. This reminder may be used as a guide in the preparation of reminders for other types of infantry companies.

PART ONE

NATIONAL GUARD BASIC PLAN

For ready reference in looking up items included in the mobilization plan an index should accompany the plan. One suggested way of handling this is indicated below. It will be noticed that the plan is divided into sections. These sections are numbered and each given a title. The topics are in the sequence that they will be discussed. However, one must not jump to the conclusion that the section headings as given have to be rigidly followed or are the only way (or the prescribed way) of preparing a mobilization plan. This is but one way. At the same time, the division as indicated will cover the subject as fully as regulations require. Any other matters which may arise owing to local or special conditions can be included in a special section or sections.

INDEX

	SECTION NO.
Purpose and mission	I
Personnel	II
Intelligence	III
Organization, training and supply	IV
Action prior to M-day	V

LIST OF ATTACHED PAPERS

Here list whatever papers are attached to the plan.

I

PURPOSE AND MISSION

The first part of the mobilization is that part which gives the purpose and mission of the plan. These might be stated as indicated below. Under each subdivision is given an explanation which should be carefully read and followed as the plan is made up.

1. *PURPOSE*

Here set forth in detail the purpose as given by higher authority. Any necessary supporting papers should be appended to the plan.

2. *MISSION*

Here should be stated in full the mission as given by, or as deduced from, instructions issued by higher headquarters.

3. *CUSTODY OF THE PLAN*

Here should be stated who is responsible for the custody of the plan and who are furnished copies. Give number of copies furnished together with the copy numbers.

4. *REVISION OF THE PLAN*

Here should be stated when and how revisions will be made, and who will be notified of changes.

II

PERSONNEL

All the many and varied questions relative to personnel should be gathered in one place and plainly answered so that in case of mobilization the whole matter will proceed smoothly even if the commanding officer is absent, sick, or for any reason not available to answer questions. Here, as in all other parts of a mobilization plan, matters should be

so definitely prescribed, that a consultation of the plan will settle practically all of the broad questions which may arise. A method of breaking-down the personnel factor is given below.

1. *AUTHORIZED STRENGTH PRIOR TO MOBILIZATION*

Here should be stated the present authorized peace strength of the unit or units prior to mobilization. (May be shown by table as an appendix.)

2. *WAR STRENGTH*

Here should be stated the war strength of the unit or units. (May be shown by table as an appendix.)

3. *CADRES TO BE FURNISHED*

Here should be shown the enlisted cadres, if any, that the unit or units are required to furnish other organizations. (Show by table.)

4. *RECRUITING*

a. Here state any provisions for recruiting that may be necessary, including instructions of the higher commander.

b. Here make provision for physical examination of applicants. This should be made by a medical officer if one is available, otherwise by a civilian physician whose services may be procured under the provisions of paragraph 26, AR 130-10.

c. Here state provisions for the assignment of recruits.

III

INTELLIGENCE

The intelligence portion of any mobilization plan may be, and probably is, a small matter but unless properly attended to may cause serious consequences. Below is a suggested method of treating this matter.

1. *COMBAT INTELLIGENCE*

Here should be stated the provisions for the appointing and training of intelligence personnel. See paragraph 10, MR No. 2-1.

2. *COUNTER-ESPIONAGE*

Here should be stated what provisions are made for counter-espionage within the unit or units.

3. *PUBLICITY AND CENSORSHIP*

Here should be stated what arrangements are made with reference to publicity and censorship within the unit or units.

IV

ORGANIZATION, TRAINING AND SUPPLY

In this section it will be noted that Army and other regulations are mentioned frequently, certain forms are required, rosters are needed, reports are mentioned. All these matters need careful attention. It would be wise to check this section carefully to ascertain what regulations are needed and have them on hand for consultation. The same applies to reports, rosters and so forth.

The reason for this is simple. Manifestly, it is an absurdity to say that the messing of an organization will be taken care of as provided in AR 130-10, if there is no copy of this Army Regulation within the organization. The fact that the commander knows where to get the information is of little value if he lacks the proper document. Actually, an important part of the mobilization plan is to secure beforehand all the necessary documents that are required for mobilization. For instance, an organization commander with sick men on his hands during the mobilization period will have no opportunity to delay medical treatment until he can acquire by mail the regulation which tells him how to go about the matter. Since National Guard units, such as companies, are often separated widely from other units

that might have the required regulations which could be borrowed, this matter of having the necessary regulations and documents is highly important. Furthermore, it can be expected that in a mobilization the securing of documents, regulations, or forms cannot be accomplished readily. All these things should be available. To repeat, one should check every reference given in this section in order to ascertain that the forms, regulations, orders and the like are on hand. They virtually are a part of the plan.

1. *WARNING AND MOBILIZATION ORDERS*

a. Manner of notifying individuals to assemble.

(1) Here should be stated the form of message, and the means to be used to warn individuals upon the approach of mobilization in case this warning is received from higher authority. Secret measures may be necessary. Refer to annex if desirable.

(2) Here should be stated the form of message, and the means to be used to notify individuals to assemble when mobilization is ordered. Refer to annex if desirable

(3) Here should be indicated the form of message revoking leaves of absence and furloughs.

b. Addresses and telephone numbers of subordinate commanders and individuals of the unit.—Refer to an annex showing names, together with home addresses and telephone numbers.

c. Action to be taken in case men fail to report.—Here should be stated plan. (Par. 14*c*, AR 130-10.)

d. Action in case men report with contagious diseases.—Quote Army Regulations, and give any other necessary instructions. (Par. 25, AR 130-10.)

e. Action in case men from other units report.—Quote Army Regulations, and give any other necessary instructions. (Par. 15, AR 130-10.)

f. Personnel absent from the city.—Here should be given the plan for notification of personnel absent at places distant from home station and unable to report because of lack of funds. (Usually direct that they report to the nearest military authority. See Par. 15*e*(1), AR 130-10.)

g. Personnel sick.—Here should be stated the plan to care for personnel who are sick and unable to report. (Par. 16, AR 130-10.)

2. *ASSEMBLY AT TRAINING CENTER*

Here should be stated the provision for having those absent, when unit departs from its station, report to their proper unit at training center.

3. *SANITATION AND MEDICAL SERVICE*

a. Sanitation.—Here should be stated provisions for bathing, toilet, and laundry facilities, and any special instructions regarding their use. Also include in this paragraph arrangements for disposal of waste and any other necessary sanitary instructions.

b. Here make provision for the physical inspection prescribed by paragraph 25, AR 130-10, and if no medical officer is available give the name of the local doctor who is to be secured under paragraph 25, AR 130-10.

c. Physical examination and vaccination.—(Par. 25*d*, AR 130-10.)

d. Care of sick.—Here should be noted the place or places where medicines and other medical supplies can be obtained. Also note here the necessary arrangements for hospitalization. (Par. 26, AR 130-10.) Give name of local hospital to be used.

e. Action to be taken in case of any deaths.—Quote the instructions contained in Army Regulations No. 600-550 (Personnel—Deceased).

f. Here provision should be made for daily sick call and if no medical officer is available give the name of the local doctor who will be secured under paragraph 26, AR 130-10.

g. Here make provision for securing necessary medical supplies prescribed at sick call, giving name and location of the drug store which is to furnish them under paragraph 26, AR 130-10.

4. *MOBILIZATION REPORTS*

a. Special basic returns. (Par. 21, AR 345-55.)

b. Special roster. (Par. 50, AR 345-900.)
c. Special strength reports. (Par. 24, AR 345-55.)

5. *INDIVIDUAL AND UNIT RECORDS*

Here should be listed individual and unit records. (See AR 130-10 and AR 345-55.) They will usually consist of the following:

a. Morning report (Par. 24, AR 130-10 and AR 345-400).
b. Initial return as of 2 M (Par. 24, AR 130-10).
c. Initial roster (Form 703 AGO). (See paragraph 24*c*, AR 130-10.)
d. Individual records of officers (Form 63 NGB). (Par. 42, AR 130-10.)
e. Individual records of enlisted men (Form 21-24 NGB). (Par. 42*a*(2), AR 130-10.)
f. Daily sick report. (Par. 24, AR 150-10 and AR 345-400.)
g. Duty roster. Form AGO No. 6. (AR 345-25.)
h. Correspondence book. Form AGO No. 8. (AR 345-620.)
i. Service record. Form AGO No. 24. (AR 345-125.)
j. Extracts from service record. Form AGO No. 25. (AR 345-125.)
k. Strength return. Form No. 73 AGO. (AR 345-50 and AR 345-55.)
l. Individual clothing record. Form No. 32 AGO. (AR 615-40.)
m. Pay cards. Form No. 644 AGO.
n. Pay rolls EM. Form No. 366 WD 366*a* and 369. (AR 354-155.)
o. Ration returns. Form QMC No. 72. (AR 35-6720.)
p. Diary. Form AGO No. 73. (AR 345-100.)
q. Company orders file. (AR 310-50.)

6. *TRAINING*

Here should be stated provisions for training during the period the organization will remain at the home station. It is possible that there may be an interval between M-day and the actual departure of the company.

a. Training program.—Here reference should be made to an attached program of training based upon the regimental training program and such other instructions as are received from the higher commander. (See Mobilization Regulations 3-1.)

b. Training schedule.—Here reference should be made to an attached schedule made up for one week in accordance with the training program.

c. Recruit training.—Here reference should be made to an attached training schedule for recruits.

d. Training ground.—Here make provision for suitable training ground. If necessary it may be rented. (AR 130-10.)

7. *SUPPLY*

a. Requisitions.—Unless equipment is to be supplied by other means, state arrangements for submitting requisitions for complete organizational and individual equipment.

b. Subsistence.—

(1) Here make provision for messing of personnel until messes can be established. Give name of hotel or cafe. (Par. 19, AR 130-10.)

(2) Here make provision for the establishment of a unit mess on M-day or as soon thereafter as practicable. (Par. 19, AR 130-10.)

(3) Here make provision for the messing of officers. (Par. 21, AR 130-10.)

c. Transportation.—Here show what transportation has been assigned to the unit and what additional transportation will be needed to transport baggage and equipment to railroad station (Par. 37, AR 130-10), and what civilian company will furnish it.

d. Quarters for troops.—Here state the plan for the quartering of troops if adequate armory facilities are not available. (Par. 22, AR 130-10.)

8. *AGENT OFFICER*

Here designate an agent officer.

9. *PROPERTY*

Here state arrangements for disposition of property—federal, state, and organizational. (Pars. 28 and 32, AR 130-10.)

10. *VACATING OF PUBLIC BUILDINGS*

Here state provisions for vacating any public buildings which may be occupied by military personnel, together with arrangements with the proper state authorities to take charge of the armory and state property upon departure of the unit.

V

ACTION PRIOR TO M-DAY

To prepare a proper mobilization plan is all very well, but it may rapidly become obsolete and, consequently, it needs constant revision to keep it up to date and frequent tests to determine if it will work. It is, therefore, necessary to give more than casual thought to the mobilization plan after it is once made. The following suggestions are made relative to the routine action on mobilization plans that should be taken before M-Day.

1. *STUDY OF MOBILIZATION PLANS*

Here should be outlined the provisions that should be made for the regular study, under the personal supervision of the station commander of the mobilization plan. This is necessary to insure that members of the units at that station thoroughly understand their duties in case of mobilization.

2. *TEST MOBILIZATION*

Here provision should be made for practice mobilization and inspections, in order that the company commander and higher commanders may be assured that units are prepared at all times to respond quickly with proper equipment in case of general mobilization. It is wise, therefore,

to state here appropriate provisions for practice mobilization and inspections. These will usually be ordered by the higher commander.

3. *REPORT OF PRACTICE MOBILIZATION AND INSPECTIONS*

Here state what reports are required of practice mobilization and inspections.

APPENDIXES AND ANNEXES

To any mobilization plan certain appendixes are essential. These often are the essence of the plan and careful attention should be given to their preparation. The series of appendixes that follow are the minimum deemed requisite. Local conditions, however, will often make it necessary to include other appendixes. Only the man on the ground can determine that.

The appendixes listed, herewith, are those that would cover a station at which is located but one company—the most complicated situation of all for one officer to resolve. A basic plan prepared by a regiment or a battalion would have appendixes covering essentially the same topics but in a more general way. This fact should be carefully considered and clearly understood when studying the appendixes and annexes that follow. Consider them as forms which for purposes of illustration are applied to one company. But they can be just as easily applied to a higher unit. Appendix No. 3, for instance, which is a company order with several annexes, would in case of a regiment at one station become a regimental order and the annexes, naturally, regimental annexes; in case of a battalion at one station it would become a battalion order. These appendixes and annexes illustrate how a one-company station solves its problem. With slight changes in headings and content the appendixes and annexes can be used as models for a multi-company station.

APPENDIX NO. 1

NOTE.—This appendix will be prepared by the station commanders and will show the following information:

a. Individual clothing and equipment to be taken.

b. Any organizational property, above authorized allowances, permitted to be taken.

c. In what manner organizational property is to be carried.

d. Individual clothing and equipment NOT to be taken.

APPENDIX NO. 2

COMPANY COMMANDER'S CHECK LIST

1. *a.* Check list of organization and individual property to be taken. (Appendix No. 1.)
   b. Tags on barrack bags.
   c. Officer's equipment; weight allowance and size.
   d. Articles to be left behind and stored in armory.
   e. Menus for the required number of days of travel.
   f. Arrangements for settling local bills.
   g. List showing amounts and kinds of ammunition required.
   h. Boxes to ship organization equipment, marked as prescribed by AR 30-940.
   i. Detailed plans for moving the company property to the railroad station.
2. To be completed before entraining:
   a. Requisition for existing shortage of clothing and equipment.
   b. Telegrams to all enlisted men absent from the city.
   c. Separate roster of all enlisted men sick in hospital, absent without leave, and those who will join at mobilization center.
   d. Records of men transfered to other organizations, if any.
   e. List of men belonging to other organizations who report to the company for mobilization.
   f. Report of shortage of personnel.
   g. Disposition of company fund property.
   h. Disposition of state property.
   i. Receiving report of clothing being turned in for salvage.
   j. List of bundles of personal property left behind to be stored in the armory.
   k. Shipping tickets for any freight shipped and lists of boxes and crates, to be entered on bills of lading.
   l. Receipt for organizational equipment left behind and stored in the armory.
   m. Roster of company showing number of men by grade who accompany the organization.
   n. Detail of train guard.

APPENDIX NO. 3

Co..... .....Inf.

....., 19.....
STATION

CO ORDER }
NO. 1 }

1. *a.* (Statement of the emergency which calls for mobilization.)
   b. The NGth Infantry will mobilize at..... on .....
2. This company will mobilize at this station and prepare to move to ..... within ..... days. Company Mobilization Plan, 1938 Revision, is in effect.
3. *a.* All leaves of absence, furloughs and passes are revoked and the entire personnel of the company will report to the armory at once. Enlisted men will bring with them sufficient socks, underwear, and toilet articles for use until regular issue is made.
   b. 1st Lieutenant ....., NGth Infantry, is hereby detailed as recruiting officer in addition to his other duties. He will also supervise the preparation of the correspondence, records, reports and returns of the company. The company clerk will report to him for instructions.
   c. 2d Lieutenant ....., NGth Infantry, is hereby appointed company mess officer. He will organize and operate the company mess. The mess sergeant will report to him for instructions.
   d. Sergeant ..... is hereby detailed as instructor of recruits. He will report to 1st Lieutenant ....., NGth Infantry for instructions.
   e. 1st Lieutenant ..... NGth Infantry will have a guard posted in the armory at once. Special orders will be shown in Annex No. 1.
   f. 2d Lieutenant ..... NGth Infantry is hereby detailed as company supply officer and agent finance officer. In contracting indebtedness in the name of the United States he will be governed by the provisions of AR 130-10.
4. See Annex No. 2, Supply.
5. Company command post: Room 5 of the Armory.

.....
Captain, NGth Infantry,
Commanding.

Distribution:

ANNEX NO. 1 TO COMPANY ORDER NO. 1
GUARD DUTY

1. Until otherwise required, the guard will consist of two NCO's and six privates, and will be relieved daily at .....
2. *a.* Post No. 1 will be inside the armory.
   b. Post No. 2 will be outside the armory (give location).
3. *a.* The guard on M-day will be detailed verbally from the men first reporting.
   b. The guard on M plus 1 day will consist of the right guide of the 1st Platoon and the corporal and six privates of the 1st Squad of the 1st Platoon.

c. The guard on M plus 2 day will consist of the right guide of the 2d Platoon and the corporal and six privates of the 1st Squad of the 2d Platoon.

d. On and after M plus 3 day the guard will be detailed by roster, the detail for each day being announced at retreat the day before.

4. Orders for the guard:
   (Give orders with regard to visitors, removal of property, drinking, gambling, good order, lights, and other items as necessary.)
5. The old guard (relieved the night before) will perform duty as follows:
   a. The senior NCO will act as NCO in charge of quarters until further orders. He will supervise the police of sleeping quartes, the recreation room, halls, and entrances. He will get the mail from the orderly room and distribute it as instructed. He will check all absentees at Taps and report them to the company commander. He will report any violation of orders in barracks and any damage to public property.
   b. The junior NCO will assist the supply sergeant.
   c. The 1st Relief will act as kitchen police.
   d. The 2d Relief will act as room orderlies under the direction of the NCO in charge of quarters.
   e. The 3d Relief will report to the supply sergeant for duty.

ANNEX NO. 2 TO COMPANY ORDERS NO. 1
SUPPLY

Title
Place
Date and hour

Maps:

1. *MESSING*
   a. Commissioned personnel.—State plan for messing officers.
   b. Enlisted personnel.—
      (1) Manner of messing until unit mess or messes can be established. List rates and places where meals may be obtained. Refer to sub-annex. (See Sub-Annex No. 1.)
      (2) Establishment of unit mess or messes; instructions as to establishing messes; places where mess supplies can be procured locally. Refer to sub-annex if desirable. (See Sub-Annex No. 2.) Supply points and mess supplies to be received therefrom.
2. *SHELTER*
   a. Commissioned personnel.—State plan for sheltering officers.
   b. Enlisted personnel.—
      (1) List places where men may be quartered. Refer to sub-annex. (See Sub-Annex No. 3.)
      (2) *Shelter for storage and office space.*—Places where storage and office space may be secured. Refer to sub-annex. (See Sub-Annex No. 3.)
3. *CLOTHING AND EQUIPMENT*
   a. Instructions relative to the kind of clothing to be worn until uniforms can be issued.

b. Clothing and equipment required.—List all quartermaster, ordnance, engineer, signal, medical, and chemical warfare service supplies required and the rate at which they will be needed. Refer to sub-annex. (See Sub-Annex No. 4.)
c. Location of supply points.
d. Directions relative to requisitions.

4. *TRANSPORTATION*
a. Local transportation.—Amount necessary for hauling necessary supplies and waste; how, where, and by whom obtainable; and rates.
b. Transportation required upon departure from home station.—State amount and kind required, when needed, the destination, route to be traveled, length and duration of journey, entraining facilities, and any other pertinent information.

5. *SETTLEMENT OF FINANCIAL OBLIGATIONS*
Refer to AR 35-120 or AR 130-10.

6. *MISCELLANEOUS*
Any supply matters not otherwise covered.

(Signature)

(Authentication)
Sub-Annexes: Nos. 1, 2, 3, and 4.
No. 1—Places where meals can be obtained.
No. 2—Places where mess supplies can be obtained.
No. 3—Shelter for personnel and supplies.
No. 4—Supply requirements.

SUB-ANNEX NO. 1 TO SUPPLY ANNEX NO. 2
(Form for Listing Places Where Meals Can Be Obtained)

PLACES WHERE MEALS CAN BE OBTAINED

Restaurants, hotels, private homes, and public buildings	Location (address and telephone)	Owner	Capacity (men)	Cost per day per man	Hours	Remarks

SUB-ANNEX NO. 2 TO SUPPLY ANNEX NO. 2
(Form for listing places where supplies can be obtained)

PLACES WHERE MESS SUPPLIES CAN BE OBTAINED

Place	Location (address and telephone)	Owner	Kind of supplies	Price	Remarks

SUB-ANNEX NO. 3 TO SUPPLY ANNEX NO. 2
(Form for Listing Shelter for Personnel and Supplies)

SHELTER FOR PERSONNEL AND SUPPLIES

Private buildings, private homes	Location (address and telephone)	Owner	Capacity		Rent	Remarks
			Men	Sq ft storage		

SUB-ANNEX NO. 4 SUPPLY ANNEX NO. 2

(Form for Listing Supply Requirements)

SUPPLY REQUIREMENTS

Source of Supply	Article*	M-day	30 M	120 M
Quartermaster	Pins, tent, shelter			
Ordnance	Rifles			
Engineer	Compass, watch			
Signal	Books, field-message			
Medical	Packets, first-aid			
Chemical Warfare Service	Gas masks			

**NOTE.*—Keep items from each supply source segregated; list them all alphebetically by source.

APPENDIX NO. 4

FORM FOR WARNING SUBORDINATES OF THE APPROACH OF MOBILIZATION

Co. A NGth Infantry,
Place
Date and hour

MEMORANDUM

1. Information indicates that the NGth Infantry will mobilize in the near future.
2. You will arrange your affairs, and be prepared to report for duty upon the day of assembly, which will be announced later by telephone, telegraph, or mail.
3. The assembly point is the armory.

(Signature)

APPENDIX NO. 5

FORM FOR RECORDING ADDRESSES AND TELEPHONE NUMBERS OF MEMBERS OF UNIT

Name	Rank	Address	Telephone Number

PART TWO

NATIONAL GUARD MOBILIZATION REMINDERS

The preceding pages give in detail the method of preparing a basic mobilization plan for a National Guard unit. As noted before in the introduction to this chapter, the basic plan alone is not sufficient; it has to be supplemented by mobilization reminders written by each unit or headquarters that is the recipient of the basic mobilization plan. These mobilization reminders will differ as the unit differs. A company needs a different mobilization reminder from that required by the headquarters of a battalion or regiment. Furthermore, companies differ, and while all companies will have a group of common items in their mobilization reminders, companies of different nature, such as a headquarters or tank company, will have to consider certain additional and specialized items and incorporate them in their mobilization reminder. The same holds true, to a certain extent, for different headquarters.

In the pages of Part Two that follow are two type mobilization reminders for the National Guard. The first is for a regimental staff and the second for an infantry company. While the reminders are detailed they should not be accepted as complete. Local conditions and different type organizations or headquarters will call for additional information which should be incorporated in the reminder. The samples given should, in the main, be regarded as suggestive in nature and not forms to be blindly followed.

REGIMENTAL MOBILIZATION REMINDER

The regimental mobilization reminder which follows indicates in general the proper action to be taken by commander and staff and is an adjunct or part of the basic plan filed at regimental headquarters. This reminder should not be considered as complete for all type infantry units but it indicates the scope of the work to be considered and will quickly suggest certain additions or modifications

that should be made to suit local conditions. With modifications, this plan can also be adopted for a battalion or other headquarters. The following, therefore, may be regarded as a type mobilization reminder for a National Guard headquarters:

1. *REGIMENTAL COMMANDER*

a. Review mobilization plan of higher headquarters with particular attention to mobilization of troops; review station basic plan.

b. Discuss with staff various details (paragraph 2 to 6 inclusive, of this reminder), make necessary decisions, and direct that necessary action be taken to accomplish mobilization.

c. Inform battalion and company commanders of the situation and issue instructions relative to:

(1) Administrative details (normally promulgated by staff).

(2) Training, with particular regard to the increment recruited to bring the unit to mobilization strength. In the event the unit is not to leave its home station immediately, the training program usually will involve a change from peace-time training to intensive field training.

(3) Mobilization tests.

d. Take action outlined in paragraph 7 (individual officer).

2. *EXECUTIVE OFFICER*

a. Make the necessary arrangements and coordinate the induction of the regiment into Federal service. (See Section II, AR 130-10.)

b. If the regiment is not part of a brigade or the battalion is not part of a regiment, comply with Par. 14, AR 130-10.

c. Coordinate the operation of the staff after decisions have been made by the commanding officer.

d. Personally accompany the representative of the state on a final inspection of the armory.

e. Take action outlined in paragraph 7 (individual officer).

3. *S-1 SECTION*

a. Take steps to recall all officers and enlisted men on leave or furlough.

b. Provide for the publication of orders and instructions directed by the regimental commander.

c. Consolidate the following lists of men to be transferred:

(1) Sick in hospital and absent sick.

(2) Absent who will report at Training Center.

(3) Absent without leave.

d. Confer with Regimental Recruiting Officer and initiate steps to secure recruits. (See Par. 9, AR 130-10.)

e. Have all Regimental Fund Property to be taken with the regiment boxed and marked.

f. Provide for the sale or other disposition of Regimental Fund Property not to be taken with the regiment.

g. Have Regimental Fund Property that is to be stored boxed and marked prior to turning it into storage.

h. Box and mark all regimental files and records to be taken with the regiment. (These items would be shown in an appendix attached to this reminder.)

i. Box and mark all headquarters government property to be taken with the regiment. (Par. 28, AR 130-10.)

j. Have enlisted men of the section report to their company to perform the duties of the individual soldier incident to mobilization.

k. Pack Personnel Section Field Desk.

l. Turn over Armory to proper State authority.

m. Take action outlined in paragraph 7 (individual officer).

4. *S-2 SECTION*

a. Obtain G-2 information from Corps Headquarters.

b. Check strength and equipment of intelligence platoon with Headquarters Company Commander.

c. Have enlisted men of the section report to their company to perform the duties of the individual soldier incident to mobilization.

d. Supervise destruction of all property not sold or stored, unless task is detailed to some other officer.

e. Take action outlined in paragraph 7 (individual officer).

5. *S-3 SECTION*

a. Make estimate of the training situation and prepare programs and schedules to cover the period unit is to remain at home station (consider the probable theater of operations in which the troops will be employed, the nature of the operations to be expected, and the probable enemy).

b. Prepare warning orders, and field order for the move after conference with S-1 and S-4 regarding administrative details.

c. Prepare entrucking table (if by motor).

d. Prepare entraining table (if by rail).

e. Assist the commanding officer and executive in supervising the movement.

f. Take action outlined in paragraph 7 (individual officer).

6. *S-4 SECTION*

a. Consolidate requisitions from organizations to complete supplies and equipment in accordance with Tables of Organization, and Tables of Basic Allowances; submit to the supply services concerned.

b. Draw and issue these supplies and equipment.

c. Turn into the supply service concerned all property on memorandum receipt.

d. If movement is to be by rail:

(1) Arrange for necessary trains with the rail transportation officials.

(2) Supervise the delivery of blocking material, fuel and other supplies as necessary at the entraining points.

e. Report to S-3 the number of motor vehicles available.

f. Supervise the issue of wrapping paper, twine, and shipping tags to organizations.

g. Supervise the preparation of papers incidental to the property changes, such as shipping tickets, memorandum receipts, tally sheets.

h. Pack the field desk and other records for shipment.

i. Collaborate with S-1 and S-3 regarding the entraining or entrucking order.

j. Have enlisted men of the section report to their company to perform the duties of the individual soldier incident to mobilization.

k. Take action outlined in paragraph 7 (individual officer).

7. *INDIVIDUAL OFFICER*

a. Each officer will prepare his clothing and equipment and have it delivered to Headquarters Company.

NOTE.—Baggage allowance: Colonels, 100 pounds; Majors, 75 pounds; Captains, 50 pounds; Lieutenants, 50 pounds. Bedding roll will not exceed 24 inches in diameter, 40 inches in length, or 50 pounds in weight.

b. Each officer will make necessary arrangements for the disposition of his personal affairs.

ACTION BY REGIMENT ON SUBORDINATE PLANS

Where a National Guard regiment is scattered, having a battalion here, a group of a few companies there, or even several single companies in widely separated towns, the regimental commander will desire to check in order to see whether the basic plans prepared by his outlying units are satisfactory. This can be done by requiring a copy of the plan of the isolated stations (whether of one unit or several) to be forwarded to regimental headquarters for inspection and eventually, when all corrections are made, to be filed there. With the plans will come the mobilization reminder of the units. A study of these papers by the regimental staff will soon indicate whether the detached units can mobilize smoothly and efficiently. If instruction is needed it can be then given. At the same time such matters as the type and amount of training to be given to the units prior to proceeding to the training center can be outlined for incorporation in the plan if deemed desirable.

On the other hand, when a National Guard regiment is all in one city the procedure is simpler since the regiment has furnished the basic plan. The subordinate units merely furnish for approval and file a copy of their mobilization reminder. A check by the regimental staff will indicate whether subordinate units have covered the ground thoroughly and are prepared.

From the foregoing it can be seen that each National Guard unit, of a company or larger, and each staff will have a plan. This plan will be furnished by the commander of the station where the unit is located. To this the subordinate unit will attach the mobilization reminder applicable to that particular organization. There will be nothing more. For a regimental headquarters to make out a mobilization reminder for all its sub-units—even if it could be done competently—is outside its province. To furnish the basic plan is enough; let the subordinate unit make out its own mobilization reminders. The superior headquarters should only check on these reminders to see if they are satisfactory.

COMPANY MOBILIZATION REMINDERS
(National Guard)

Immediately following is a guide for the preparation of a company mobilization reminder to cover the period from the time when mobilization is imminent until it is completed. The items not appropriate to a particular company may be omitted. Other items can and should be added to fit local conditions and the type of organization. Officers charged with preparing these reminders can lighten their work on mobilization or test mobilization if they make an extra copy of the reminder. From this extra copy can be clipped the statement of work which each individual is required to do. On a test mobilization the mess sergeant, for instance, can be handed a copy of exactly what he is required to do and told to start. A copy of instructions which apply to the command as a whole can be posted on the bulletin board.

1. *COMPANY COMMANDER*

a. Review station mobilization plan.

b. Inform officers and noncommissioned officers of the situation and direct that necessary action be taken to accomplish mobilization.

c. Appoint a recruiting officer, and such assistants as may be necessary, to have charge of all recruiting activities.

d. Appoint a mess officer and arrange for the starting of a company mess.

e. Appoint a company supply officer.

f. In the absence of a medical officer arrange for the hire of a civilian doctor. (Par. 25, AR 130-10.)

g. Secure cash from the company fund for miscellaneous purchases or be prepared to pay by check.

h. Arrange settlement of all local bills.

i. Arrange for a guard, to consist of 2 noncommissioned officers and 3 reliefs of 2 privates each for each passenger car, to be established upon entraining to preserve order, prevent damage to cars, riding on platforms, and enlisted men leaving the train at stops.

j. Make the final inspection of the company.

k. Check carefully the items on the company commander's check list. (See Appendix No. 2.)

l. Personally accompany the representative of the state on a final inspection of the armory.

2. *OFFICERS*

a. Each officer will prepare his own clothing and equipment.

NOTE.—Baggage allowance: captain 50 pounds; lieutenant 50 pounds. Bedding roll will not exceed 24 inches in diameter, 40 inches in length, or 50 pounds in weight.

b. Each officer will make necessary arrangements for disposition of his personal affairs.

c. Platoon leaders will see that their platoons comply with the provisions of paragraphs 7, 8, 9, and 10 of this reminder.

d. The officer detailed as mess officer will supervise the

establishment of the mess and later supervise it while en route to the training center. He will arrange for the necessary details to operate the mess.

e. The company supply officer will have general supervision of the supplies while en route, to include the loading of baggage and freight. It is necessary for him to:

(1) Arrange for the necessary details to handle baggage and freight.

(2) Arrange with the railroad company for the spotting of necessary equipment.

f. The second-in-command will assist the company commander, particularly in supervising the settlement of accounts and in disposing of company fund property. He will check all reports, shipping tickets, lists of property (to be stored or shipped) and memorandum receipts.

3. *FIRST SERGEANT*

a. Report at once to the company commander.

b. Perform the duties of the individual soldier. (Par. 10.)

c. Perform the duties of a section leader for the clerks and buglers.

d. Post a guard as ordered.

e. Arrange for the necessary details to be sent upon request to the supply sergeant and mess sergeant.

f. Instruct the company clerk to make out reports relative to the men who do not leave with the company (sick in hospital, absent but who will report at camp, absent without leave); and to prepare telegrams to men on furlough.

g. Prepare a report of the strength of the company showing the number of men by grade who actually accompany the oragnization. (The report will be submitted to regimental headquarters by the company commander.)

h. Form the company at the proper time.

4. *MESS SERGEANT*

a. Perform the duties of the individual soldier. (Par. 10.)

b. Perform the duties of a section leader for his kitchen force.

c. If and when a mess is to be organized, he will, under the direction of the mess officer, complete its organization.

d. Cause all kitchen equipment to be cleaned thoroughly and placed in readiness.

e. Draw from the supply sergeant all necessary field equipment.

f. Recommend the purchase of any additional equipment needed. (AR 130-10, Par. 17.)

g. If ordered to open the mess he will arrange—until regular issues are made by the government—to purchase the necessary rations, soap, candles, matches, toilet paper and ice from the following wholesalers. (Give list by name, address and telephone number.) (Par. 19, AR 130-10.)

Below is a suggested original purchase order for 750 rations:

Beef, fresh*	625	lbs.
Bacon	185	lbs.
Flour	100	lbs.
Bread, fresh*	745	lbs.
Baking powder	3.5	lbs.
Beans	60	lbs.
Hominy	35	lbs.
Potatoes	565	lbs.
Onions	185	lbs.
Tomatoes, canned	185	lbs.
Prunes	30	lbs.
Jam	30	lbs.
Coffee, roasted and ground	52.5	lbs.
Sugar	150	lbs.
Milk, evaporated	23.5	lbs.
Vinegar	2	gals.
Pickles	7	qts.
Salt	30	lbs.
Pepper	1.5	lbs.
Spices	7.5	ozs.
Lard	30	lbs.
Butter	23.5	lbs.
Syrup	7.5	gals.
Flavoring extract	10.5	ozs.

*To be delivered as ordered.

h. Prepare a special ration return, to be delivered to the quartermaster upon arrival at the training center, covering the period for which purchases were made but not paid for in cash by an agent officer. (Par. 19, AR 130-10.)

i. Arrange to carry cooked or travel rations for the

journey and garrison rations for two (2) days after arrival at destination.

j. Prepare menus for the required number of days of travel.

5. *SUPPLY SERGEANT*

a. Perform the duties of the individual soldier. (Par. 10.)

b. Perform the duties of a section leader for the armorer and artificer.

c. Furnish the platoon sergeants the necessary shipping tags and twine for barrack bags.

d. Check in to the supply room from the section leaders all surplus government equipment and clothing, and sort it into piles of the same kind of clothing and equipment. All surplus clothing will be listed on shipping ticket and turned in to the supply officer.

e. Prepare credit memorandum receipts for any state property which is to be turned back to the state.

f. Prepare requisitions for clothing and equipment to meet all existing shortages.

g. Prepare a list of amounts and kinds of ammunition required.

h. Prepare a list of all company property which is to be stored in the armory.

i. Have ready boxes in which organizational equipment is to be shipped marked as prescribed by AR 30-940.

j. Prepare the shipping tickets and Form No. 33 and clothing accounts of all men who are to be transferred to other organizations, when the 1st sergeant furnishes their names.

k. When *a* to *h* are completed, he will report that fact to the 1st sergeant.

6. *COMPANY CLERK*

a. Perform the duties of the individual soldier. (Par. 10.)

b. Prepare telegrams for the recall of all men of the company on furlough and detached service.

c. Prepare for submission to regimental headquarters, separate rosters of:

(1) Men sick in hospital and absent sick.

(2) Men belonging to other organizations who report to the company for mobilization.

(3) Men absent who will report to the company upon arrival at training center.

d. Prepare for submission to regimental headquarters an informal report of the number of replacements necessary to fill the company to full strength.

e. Prepare the necessary records for discharge of all enlisted men holding reserve commissions if they have been called to active duty as such.

f. Prepare records of men to be transferred, if any.

g. Check and pack the field desk.

7. *PLATOON SERGEANT*

a. Perform the duties of the individual soldier. (Par. 10.)

b. Obtain reports from the squad leaders with reference to absentees.

c. Have the platoon prepared for inspection at the designated place and check all equipment and clothing listed to be taken. (Appendix No. 1.)

d. Supervise the issue of the additional equipment. (Appendix No. 1.)

e. Assist the platoon leader, first, in the full-field inspection and, second, the assembly of rolls and barrack bags immediately thereafter. He will have the packs and barrack bags deposited in the designated place.

f. Supervise the performance of the initial duties of the men in the platoon.

g. Reorganize the platoon into squads and sections with the present available strength.

h. Report to the 1st sergeant when *a* to *g* have been completed.

i. Have the platoon area thoroughly policed.

8. *SECTION LEADER*

a. Perform the duties of the individual soldier. (Par. 10.)

b. Assist the platoon sergeant in reorganizing the platoon, issuing equipment, preparing it for inspection and assembling it thereafter.

c. Check in all surplus government clothing and equipment of the members of his section. He will have these articles assembled in bundles of ten each and turned in to the supply sergeant.

9. *SQUAD LEADER*

a. Get in communication by telephone with each member of his squad and notify them of mobilization.

b. Perform the duties of the individual soldier. (Par. 10.)

c. Check the members of his squad and be prepared to render a report on absentees.

d. Supervise the preparation of the equipment of the squad for inspection by the platoon leader and its assembly upon completion of the inspection. He will see that each barrack bag is properly tagged with the man's name, rank, organization, company number and serial number.

e. Assist the section leader in the checking of the surplus government clothing and equipment.

f. Upon reorganization of his squad, he will assure himself that the necessary additional equipment listed in Appendix No. 1 is secured by each member of the squad.

g. Supervise the policing of his area of the armory.

10. *INDIVIDUAL SOLDIER*

a. Report promptly at the armory when he receives notice of mobilization.

b. Bring with him the following articles:

Three (3) pairs socks, wool
Four (4) handkerchiefs
Two (2) suits underwear
Two (2) towels
One (1) set toilet articles consisting of razor, soap, toothbrush and paste, and comb and brush.

c. Make the necessary arrangements with his employer for leave of absence due to mobilization.

d. Arrange his family affairs so that he may depart with the company.

e. Report to his squad leader immediately upon arriving.

f. Display his full field equipment, at the designated place, for inspection. In addition to normal articles displayed, he will display all extra articles of clothing and equipment that are to be carried in his barrack bag.

g. Upon completion of the inspection he will assemble his full field equipment and place it as instructed. The additional articles will be packed in the barrack bag, tagged with his name, rank, organization, company number and serial number and the barrack bag will be placed as directed.

h. Each man will turn in to his section leader all articles of federal or state clothing and equipment not listed to be taken. (Appendix No. 1.) Cots, pillows, mattresses and wall lockers will be left in position to be checked.

APPENDIX NO. 1

NOTE.—This appendix will be prepared by the company commander and will show the following information:

a. Individual clothing and equipment to be taken.

b. Any organizational property, above authorized allowances, permitted to be taken.

c. In what manner organizational property is to be carried.

d. Individual clothing and equipment NOT to be taken.

APPENDIX NO. 2

COMPANY COMMANDER'S CHECK LIST

1. *a.* Check list of organization and individual property to be taken. (Appendix No. 1.)
   b. Tags on barrack bags.
   c. Officers' equipment; weight allowance and size.
   d. Articles to be left behind and stored in armory.
   e. Menus for the required number of days of travel.
   f. Arrange settlement of local bills.
   g. List showing amounts and kinds of ammunition required.
   h. Boxes to ship organization equipment, marked as prescribed by AR 30-940.
   i. Detailed plans for moving the company property to the railroad station.
2. To be completed before entraining:
   a. Requisition for existing shortage of clothing and equipment.

b. Telegrams to all enlisted men absent from the city.
c. Separate roster of all enlisted men sick in hospital, absent without leave, and those who will join at mobilization center.
d. Records of men transfered to other organizations, if any.
e. List of men belonging to other organizations who report to the company for mobilization.
f. Report of shortage of personnel.
g. Disposition of company fund property.
h. Disposition of state property.
i. Receiving report of clothing being turned in for salvage.
j. List of bundles of personal property left behind to be stored in the armory.
k. Shipping tickets for any freight shipped and lists of boxes and crates, to be entered on bills of lading.
l. Receipt for organizational equipment left behind and stored in the armory.
m. Roster of company showing number of men by grade who accompany the organization.
n. Detail of train guard.

PART THREE

REGULAR ARMY BASIC PLAN *

There is no prescribed form for a Post Mobilization Plan. Any form is satisfactory which covers the necessary details and will insure an orderly mobilization. The following should be considered only as a suggested way of building up a mobilization plan. The contents of each heading or sub-heading will vary with the size of the post, local conditions, and the nature of instructions received from higher authority.

Officers responsible for the preparation of Post Mobilization Plans should make a thorough study of the War Department Protective Mobilization Plan, the Corps Area Mobilization Plan, AR 120-10, AR 330-5, and Mobilization Regulation Nos. 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7, 1-8, 1-9, 2-1, 3-1, 4-1, 4-2, and 4-3.

For an easy reference an index should accompany the Basic Mobilization Plan. Below is given a suggested index. However, this index is not to be considered as a mandatory form; it is only suggestive in nature. Local conditions may well call for a more extensive index, but, in general, this index can be used for a guide.

INDEX	*SECTION NO.*
General	I
Mobilization of troops	II
Corps Area installations	III
Subordinate plans (annexes)	IV
Action prior to M-day	V

*Before studying Part Three and Part Four it is suggested that the reader, if he has not already done so, turn to the first part of the chapter and read the introduction. It will also help if the opening remarks of Part One and Part Two are read carefully.

I

GENERAL

The first part of the Regular Army mobilization plan is that part which gives the general scope of the plan. It might be organized as indicated below.

1. *PURPOSE*
Here state the purpose of the post plan.

2. *SCOPE*
Here state the scope of the plan.

3. *CUSTODY OF THE PLAN*
Here state who is responsible for the custody of the plan and who are furnished copies, together with the numbers of the copies furnished.

4. *WARNING INFORMATION*
Here state the action to be taken to inform the command when information is received that M-day is imminent, or on M-day, if information is not received prior thereto.

NOTE.—This section should contain general basic information. Such information as is considered necessary is taken from the Corps Area Plan. It will require a study of the Corps Area Plan to determine what items are to be placed in this general section.

II

MOBILIZATION OF TROOPS

The second part of the plan is the necessary measures to be taken for mobilizing the troops. While these measures, for the most part, will be similar in all Regular Army units, local conditions will make changes necessary in order to fit this guide to a concrete and practical situation. The items given below indicate clearly the scope of this section.

1. *UNITS TO BE MOBILIZED*

Tables should be prepared showing the units and individuals which the post is charged by the Corps Area Mobilization Plan with mobilizing. Here reference should be made to these tables (Tables No. ..... to No. ..... attached.)

2. *ADMINISTRATIVE PLAN*

Here, in general terms, should be stated the administrative action to be taken by organizations leaving the post in the event of mobilization. In general, provisions should be made for:

a. Relief of special duty men.
b. Casualties.
c. Guard.
d. Supply.
e. Messing.
f. Property accountability and responsibility.
g. Clothing and individual equipment.
h. Organizational equipment.
i. Transportation.
j. Vacating quarters and turning over buildings.
k. Such other pertinent items as may be found necessary to meet local conditions.

Reference should be made to an ADMINISTRATIVE ANNEX, if any. (Annex No. 1.)

3. *TRAINING*

Here should be stated in general terms, the provisions for mobilization training commencing on M-day, or when information is received that M-day is imminent, providing the troops do not leave the post immediately. Training should be planned in accordance with MR 3-1. Reference should be made to a TRAINING ANNEX, if any. (Annex No. 2.)

4. *MILITARY INTELLIGENCE*

Here should be stated in general terms, the organization for counter-espionage service to be established and maintained within the units prior to and during mobilization

(MR 2-1). Reference should be made to an INTELLIGENCE ANNEX, if any. (Annex No. 7.)

5. *PROCUREMENT AND RECEPTION OF VOLUNTEERS*

Here should be stated in general terms, the plan for the procurement and reception of enlisted men during the recruiting period of mobilization, including the planning, organizing, and the operation of recruiting parties, and plans for processing and classification of recruits received. (See MR 1-1.)

Tables should be prepared showing the recruits required to bring existing units to peace strength and war strength. Reference should be made to these tables (Tables No. ..... to No. ..... attached) and to a PROCUREMENT AND RECEPTION OF VOLUNTEERS ANNEX, if any. (Annex No. 8.)

6. *MEDICAL*

Here should be stated in general terms, the provisions for furnishing the troops now at the post with medical personnel, equipment, and supplies when they leave the post (MR 4-3). Reference should be made to a MEDICAL ANNEX, if any. (Annex No. 9.)

7. *LIQUIDATION OF POST EXCHANGE*

Here should be stated in general terms, the plan for the liquidation of the Post Exchange in the event of mobilization. It should include provision for the payments to be made to units leaving the post for their Post Exchange shares. Reference should be made to a POST EXCHANGE ANNEX, if any. (Annex No. 10.)

III

CORPS AREA INSTALLATIONS

Section III of the plan covers the Corps Area installations for which the post or station has a responsibility.

This, naturally, will vary with each post. However, the items below will be useful as a guide in preparing this part of the plan.

1. *ADDITIONAL UNITS TO BE MOBILIZED*

A table should be prepared showing additional units, if any, to be mobilized at the post (Table No. ..... attached).

2. *REPLACEMENTS TO BE MOBILIZED*

A table should be prepared showing replacements, if any, to be mobilized and trained at the post (Table No..... attached).

3. *OTHER INDIVIDUALS TO BE MOBILIZED*

A table should be prepared showing other individuals, if any, to be mobilized at the post (Table No. ..... attached).

4. *WAR DEPARTMENT AND CORPS AREA INSTALLATIONS TO BE ESTABLISHED*

Here should be indicated any War Department or Corps Area installations to be established at the post. This might include:

a. Reception center.—Where men are turned over to the military and where they are received and processed. In the event of its establishment, reference should be made to a RECEPTION CENTER ANNEX (Annex No. 13).

b. Replacement center.—Where individuals are trained for "loss" and "filler" replacements. In the event of its establishment, reference should be made to a REPLACEMENT CENTER ANNEX (Annex No. 14).

c. Mobilization center.—Where individuals are formed into organizations and given unit training. In the event of its establishment, reference should be made to a MOBILIZATION CENTER ANNEX (Annex No. 15).

d. School center.—Where officer candidates and enlisted specialists are trained. In the event of its establishment, a table should be prepared showing officer candidates and enlisted specialists to be trained (Table No. ..... attached), and a reference should be made to a SCHOOL CENTER ANNEX (Annex No. 16).

5. *POST SERVICE COMMAND*

Tables should be prepared showing the personnel requirements for each post activity and installations. Reference should be made to these tables (Tables No. ..... to No. ..... attached) and to a POST SERVICE COMMAND ANNEX, if any (Annex No. 11).

6. *ADMINISTRATIVE PLAN*

Here should be shown, in general, the plan for expanding the present administrative organization to carry the added load incident to the establishment of a Corps Area installation (or installations). Reference should be made to the ADMINISTRATIVE ANNEX, if any (Annex No. 1).

7. *TRAINING*

Here should be stated, in general, the training plans relative to:

Cadres
Officers' Schools
Enlisted Specialists' Schools
Unit Training
Replacement Training
Organization of Schools
Training Equipment
Apportionment of Areas and Facilities
Mobilization Training Schedules.
(MR 3-1 and Section VI, MR 4-2).

Reference should be made to the TRAINING ANNEX, if any (Annex No. 2).

8. *SUPPLY*

Here should be set forth in clear, brief, and general language, the framework of the plan for supply from corps area supply point, to distributing point. Reference should be made to a SUPPLY ANNEX, if any (Annex No. 3).

9. *CONSTRUCTION AND SHELTER*

Here should be stated, in general terms, arrangements for: use of existing buildings, utilities, and tentage; in-

crease and extension of existing utilities to fit the projected needs; new construction needed for such installations as may be required by the Corps Area Mobilization Plan. New construction plans should include the number of buildings to be constructed, their type, plan, and location, and provide for necessary utilities such as water, sewerage, power, light, and roads, including cost estimate (MR 4-2). Reference should be made to a CONSTRUCTION AND SHELTER ANNEX, if any. (Annex No. 4.)

10. *SIGNAL COMMUNICATION*

Here should be shown the general plan for expanding the present post communication system to take care of Corps Area installations to be established under the Corps Area Mobilization Plan. Reference should be made to a SIGNAL COMMUNICATION ANNEX, if any. (Annex No. 5.)

11. *FINANCE PLAN*

Here should be stated, in general terms, the provisions for supplying, equipping, housing, and procuring of additional personnel, both military and civilian, in connection with the expansion of the present finance organization to care for increased activities incident to the establishment of Corps Area Mobilization Plan. Reference should be made to a FINANCE ANNEX, if any. (Annex No. 6.)

12. *MILITARY WELFARE AND RECREATION*

Here should be stated a general plan for establishing welfare and recreation activities on and after M-day (MR 1-2). Reference should be made to a MILITARY WELFARE AND RECREATION ANNEX, if any. (Annex No. 12.)

13. *MILITARY INTELLIGENCE*

Here should be stated, in general terms, the plan for the expansion of the present post intelligence organization (MR 2-1). Reference should be made to the INTELLIGENCE ANNEX, if any. (Annex No. 7.)

14. *PROCUREMENT AND RECEPTION OF VOLUNTEERS*

Here should be stated, in general terms, the plan for the procurement of enlisted men as indicated below, during the recruiting period of mobilization, including the planning, organizing, and operation of recruiting and reception centers (MR 1-1). Tables should be prepared showing:

a. Recruits for new units. (Table No. ..... attached.)

b. Recruits for replacements. (Table No. ..... attached.)

c. Recruits for War Department and Corps Area installations. (Table No. ..... attached.)

d. Recruits for Post Service Command. (Table No. ..... attached.) Reference should be made to the PROCUREMENT AND RECEPTION OF VOLUNTEERS ANNEX, if any. (Annex No. 8.)

15. *MEDICAL*

Here should be stated, in general terms, the provisions to be made for the expansion of the present medical service to take care of a new Corps Area installation (or installations) ordered to be established at the post (MR 4-3). Reference should be made to the MEDICAL ANNEX, if any. (Annex No. 9.)

16. *LIQUIDATION OF POST EXCHANGE*

Here should be stated, in general terms, the plan for the reorganization and expansion of the Post Exchange to take care of a new Corps Area installation (or installations) ordered for the post. Reference should be made to the POST EXCHANGE ANNEX, if any. (Annex No. 10.)

IV

SUBORDINATE PLANS (ANNEXES)

Certain subordinate plans are needed at any post. These plans should be prepared in the form of annexes to the basic plan. The point to note here is that such subordinate plans are not to be prepared by subordinate units, but are

prepared by post staff officers and are based on the body of the Post Plan and on similar annexes to the Corps Area Plan. They contain specific and detailed information relative to portions of the Basic Plan and since they amplify the Basic Plan quite properly they should be filed as annexes to the plan. The type of plans and who should prepare them as annexes are tabulated below. Here should be listed the subordinate plans (annexes); for example:

NO.	DESIGNATION	PREPARED BY
1	Administrative	Adjutant
2	Training	Officer designated by Post Commander
3	Supply	Quartermaster
4	Construction and Shelter	Quartermaster
5	Signal Communication	Signal Officer
6	Finance	Finance Officer
7	Intelligence	Officer designated by Post Commander
8	Procurement and Reception of Volunteers	Recruiting Officer
9	Medical	Surgeon
10	Post Exchange	Post Exchange Officer
11	Post Service Command	Adjutant, assisted by QM
12	Military Welfare and Recreation	Adjutant
13	Reception Center	Officer designated by Post Commander
14	Replacement Center	Officer designated by Post Commander
15	Mobilization Center	Officer designated by Post Commander
16	School Center	Officer designated by Post Commander

NOTE No. 1.—An officer designated by the Post Commander or the Adjutant should have general supervision over preparation of all the subordinate plans.

NOTE No. 2.—Annexes to the Post Plan are made by post Staff officers and are based on the body of the Post Plan and on similar annexes to the Corps Area Plan.

NOTE No. 3.—In the case of a small post it may be found that only two or three paragraphs are required to cover a subordinate plan. In that event the contents should be shown in the body of the plan and an annex is unnecessary.

V

ACTIONS PRIOR TO M-DAY

The actions to be taken prior to M-Day form an important part of any mobilization plan. The scope of such actions is considered below.

1. *STUDY OF MOBILIZATION PLANS*

Here provision should be made for the study, from time to time, under the personal supervision of the post commander, of pertinent mobilization plans. This is necessary in order to insure that every member of the garrison thoroughly understands his particular duties in connection with mobilization, and that all immediately concerned understand the general provisions of the War Department Protective Mobilization Plan (War Department Training Directive, 1938-1939), and the Corps Area Plan.

2. *MOBILIZATION TESTS*

Here provision should be made for practice mobilizations and inspections. In order that the post commander and higher commanders may be assured that the troops are prepared at all times to respond quickly and properly equipped in case of actual mobilization, practice mobilizations and inspections should be required. These, in order to insure readiness for mobilization, should be conducted, under direction of the post commander, as ordered by higher authority. In addition the post commander may order them as often as may be necessary to insure himself of the readiness of his command for mobilization. Usually these should consist of:

a. Practice mobilizations:

(1) Formulation by the post commander, or higher authority, of a situation under which the troops are assumed to leave the post. This situation may require actual movement from the post or merely preparation to move.

(2) Issue of necessary orders. Actual turnout of all personnel and equipment of the units involved, loading of

personnel and equipment, and actual short movement of units, if such is practicable, in accordance with assumed mobilization orders. All should be carried out in the shortest time possible, consistent with orderly procedure.

(3) Separation of cadres should be made at all mobilization tests.

(4) Muster of personnel should be made immediately after the movement is made or preparations completed. Only personnel essential for post operation should be excused and noted on report.

b. Inspections:

Here provision should be made for inspection of all required property and equipment. At these inspections, all available personnel should be present.

3. *REPORT OF MOBILIZATION TESTS*

Here state what reports are required of practice mobilizations and inspections.

4. *REVISION OF THE PLAN*

Here state when and how revisions of the plan will be made and who will be notified of changes.

PART FOUR

REGULAR ARMY MOBILIZATION REMINDERS

The mobilization reminders for the staff of a post are constructed similarly to the reminders for a regimental commander and staff and noted in detail under the National Guard heading. (See Part Two.) With proper modification and adjustment they can be applied by subordinate unit staffs. These reminders will need modification to suit the Regular Army problems and particular local conditions. However, the scope of such reminders is clearly indicated and since a regiment functions the same whether in the National Guard or Regular Army, the National Guard headquarters reminders can readily be adapted to the Regular Army. True, the problems that have to be met

may be dissimilar but the method of operation of the units will be the same. For the above reasons it is not deemed necessary to outline a mobilization reminder for Regular Army staffs.

However, the preparation of Regular Army company reminders is not so simple, and it may be well to consider the matter in some detail, in order to make the matter clear and also to indicate how flexible the mobilization reminder system is, and how it will fit any type infantry company. (As a matter of fact, it can be applied equally well to a troop or battery.)

The first thing to do is to analyze the task before a company and then articulate the work of all personnel so that this task is smoothly accomplished. To illustrate this a light tank company has been selected to indicate how simple it is to apply the system even to an organization quite technical in nature.

The task facing this company commander is precisely outlined in the basic mobilization plan furnished by post headquarters. He has a copy of this plan, and based on this he must devise a mobilization reminder that in conjunction with the basic plan will quickly and easily enable him to mobilize his organization. With the basic mobilization plan before him (such as outlined in Part Three) the company commander compiled the following *company mobilization reminder*:

MOBILIZATION REMINDER

COMPANY A, Nth INFANTRY (LIGHT TANKS)

(When mobilization is imminent and until mobilization is completed.)

INDIVIDUAL DUTIES OF OFFICERS AND ENLISTED MEN

1. *COMPANY COMMANDER*

a. Review post mobilization plan, with particular attention to mobilization of troops (Section II of Mobilization Plan of Fort Blank).

b. Inform officers and noncommissioned officers of the situation and direct action to be taken.

c. Take action outlined in paragraph 7*a*, *b*, and *c* (individual officer).

d. Take action to separate cadres if the company is required to furnish cadres.

e. Submit a ration return to date of departure, and one for the duration of the journey.

f. Obtain cash from the company fund for miscellaneous purchases, or be prepared to pay by check.

g. Settle all accounts, dispose of Post Exchange shares and return Post Exchange and theater coupons.

h. Take immediate action on the reports of deficiencies submitted by the communication officer and maintenance officer.

i. Check carefully the items on his company commander's check list (see Appendix No. 2).

j. Personally accompany the representative of the quartermaster on the final inspection of the barracks.

2. *PLATOON LEADER*

a. See that his platoon complies with the provisions of paragraphs 13, 15, and 16.

b. Upon completion of his inspection in barracks. see that all vehicles in his platoon are equipped, serviced, and ready to move.

c. Have the platoon area in the tank park thoroughly policed.

3. *COMMUNICATION OFFICER*

a. See that company headquarters section complies with the provisions of paragraphs 13 and 16.

b. Have company fund property, including that in the recreation and reading rooms, prepared for disposition, in accordance with the decision of the company commander.

c. Check all reports, shipping tickets, lists of property to be shipped, and memorandum receipts.

d. Supervise the check on company communication equipment made by the communication sergeant, and prepare requisitions for replacements needed.

4. *MAINTENANCE OFFICER*

a. See that the maintenance section complies with the provisions of paragraphs 13 and 16.

b. Initiate and supervise the mechanical inspection of all tanks and vehicles.

c. Receive reports from the noncommissioned officers making the mechanical inspections.

d. Report to the company commander the deficiencies discovered during the mechanical inspections and act on defective vehicles in accordance with the decision of the company commander.

e. Supervise the servicing of all tanks and vehicles in the company.

f. Check tools, equipment, and spare parts, and prepare requisitions for the shortages discovered.

5. *MESS OFFICER*

See that provisions of paragraph 9 are fulfilled.

6. *SUPPLY OFFICER*

a. See that provisions of paragraph 10 are fulfilled.

b. Supervise the loading of baggage and freight, using personnel detailed for this duty.

7. *INDIVIDUAL OFFICER*

a. Each officer will prepare his own clothing and equipment.

NOTE.—Baggage allowance: Captain, 50 pounds; lieutenant, 50 pounds. Bedding roll will not exceed 24 inches in diameter, 40 inches in length, or 50 pounds in weight.

b. Each officer will obtain proper clearance from Post Headquarters.

c. Each officer will make necessary arrangements for disposition of his personal effects and if married, for moving his family from the post.

8. *FIRST SERGEANT*

a. Perform the duties of the individual soldier (see paragraph 16).

b. Assisted by the reconnaissance sergeant, perform the duties of a platoon sergeant for the headquarters section.

c. Instruct the company clerk to make out reports relative to the men who do not leave with the company (prisoners awaiting trial or result of trial by General Courts-Martial; sick in hospital; absent sick) and to prepare telegrams or requests for men to be returned to the company (detached service, special duty, on furlough, garrison prisoners and those awaiting trial or result of trial by Special or Summary Courts-Martial).

d. Furnish the supply sergeant and platoon sergeants the names of the men to be transferred to other organizations.

e. Prepare a report of the strength of the company showing the number of men by grade and category who actually accompany the organization. (This report will be submitted to battalion headquarters by the company commander.)

f. Detail the necessary personnel for handling and loading rations and kitchen equipment; for handling and loading company baggage and supplies; for handling and disposing of company fund property.

9. *MESS SERGEANT*

a. Perform the duties of the individual soldier.

b. Perform the duties of a platoon sergeant for his kitchen force (paragraph 13).

c. Secure the necessary rations.

d. Cause all surplus kitchen equipment to be thoroughly cleaned and placed in the kitchen supply room ready to be checked by the quartermaster.

e. Have china and silver placed on tables in the mess hall.

f. Have mess stools and tables cleaned and left in the mess hall for checking.

g. Have the kitchen and mess hall swept and scrubbed; the garbage stand and cans cleaned; and the vegetable cellar emptied and cleaned.

h. Draw from the supply sergeant all necessary field equipment.

i. Prepare menu for the required number of days travel.

j. Report to the first sergeant when he has completed *a* to *i.*

10. *SUPPLY SERGEANT*

a. Perform the duties of the individual soldier (paragraph 16).

b. Perform the duties of a platoon sergeant for the artificer (paragraph 13).

c. Furnish the platoon sergeants the necessary shipping tags, wrapping paper and twine for barrack bags and bundles of personal property.

d. Check in to the supply room from the platoon sergeants all surplus government equipment and clothing, and sort it into piles of the same kind of clothing and equipment. All surplus clothing will be listed on shipping ticket and turned in.

e. Have all property intended for salvage segregated and the necessary I & I reports prepared and submitted.

f. Prepare credit memorandum receipts for all property held on memorandum receipt from the quartermaster. This property will be turned over to the quartermaster in the barracks and a signed receipt will be received therefor.

g. Prepare credit memorandum receipts for all property held on memorandum receipt from medical, ordnance, signal, engineer and chemical warfare supply officers, and turn the property in to their respective warehouses and obtain a receipt.

h. Prepare credit memorandum receipts for all property held on memorandum receipt from the battalion (or regiment) supply officer and receive credit therefor.

i. Requisition and draw clothing and equipment to meet all existing shortages.

j. Prepare the shipping tickets and Form No. 33 and clothing accounts of all men who are to be transferred to other organizations, upon being furnished their names by the first sergeant.

k. Prepare a list showing amounts and kinds of ammunition required.

l. Have boxes containing organization equipment marked as prescribed by AR 30-940.

m. When *a* to *l* are completed, he will report that fact to the first sergeant.

11. *COMPANY CLERK*

a. Perform the duties of the individual soldier (paragraph 16).

b. Prepare telegrams for the recall of all men of the company on furlough and detached service.

c. Prepare for submission to battalion headquarters, separate rosters of: (1) men sick in hospital and absent sick; (2) prisoners awaiting trial or result of trial by General Courts-Martial; (3) men on special duty.

d. Prepare for submission to battalion headquarters an informal report of the number of replacements by categories necessary to fill the company to full strength when transfers have been completed.

e. Prepare for submission to battalion headquarters a roster of garrison prisoners and prisoners awaiting trial by Special or Summary Courts-Martial, who are to be returned to the company for duty.

f. Prepare the necessary records for discharge of all enlisted men holding reserve commissions if they have been called to active duty as such.

g. Prepare records of men to be transferred.

h. Check and pack the field desk; insure that the following individual and unit record forms are available in sufficient quantity:

(1) Company Morning Report, AGO No. 1 (AR 345-400).

(2) Daily Sick Report, Form AGO No. 5 (AR 345-415).

(3) Duty Roster, Form AGO No. 6 (345-25).

(4) Correspondence Book, Form AGO, No. 8 (AR 345-620).

(5) Service Record, Form AGO No. 24 (AR 345-125).

(6) Extract from Service Record, AGO No. 25 (AR 345-125).

(7) Strength Return, Form AGO No. 73 (AR 345-55).

(8) Monthly Roster, Form AGO No. 9 (AR 345-900).

(9) Individual Clothing Record, AGO No. 32 (AR 615-40).

(10) Pay Rolls, E.M., Form WD No. 366, 366a and 369 (AR 354-155).

(11) Ration Returns, Form QMC No. 460 (Par. 10, AR 30-2210).

(12) Diary, Form AGO No. 73 (AR 345-100).

(13) Company Orders File (AR 310-50).

(14) Soldier's Deposit Book, QMC No. 41 (AR 345-75).

(15) Soldier's Deposits. Finance No. 10.

(16) Assignment Card, WD, AGO No. 26.

(17) Authorization for Allotment of Pay or Deduction of Pay, WD, AGO No. 29 (AR 35-5520).

(18) Notification of Discontinuance of Allotment or Deduction, WD, AGO No. 30 (AR 35-5520).

(19) Inventory of Effects, WD AGO No. 34 (AR 600-500).

(20) Individual Clothing Slip, WD, AGO No. 35.

(21) Statement of Charges, WD, AGO No. 36 (AR 345-300).

(22) Report of Physical Examination prior to Discharge or Retirement, WD, AGO No. 38.

(23) Furlough, WD, AGO No. 31.

(24) Individual Equipment Record, WD, AGO No. 33 (AR 615-40, 35-6680, and 35-6720).

(25) Designation of Beneficiary, WD, AGO No. 41 (AR 600-600 and 605-120).

(26) Certificate of Disability for Discharge, WD, AGO No. 40.

(27) Report of Desertion, WD, AGO No. 44 (AR 615-300).

(28) Descriptive List of Deserter, WD, AGO, No. 45 (AR 615-300).

(29) Report of Apprehension of Deserter, WD, AGO No. 46 (AR 615-300).

(30) Discharge Certificate, WD, AGO No. 55, No. 56, No. 57 (AR 615-360).

(31) Report of Death, WD, AGO No. 52 (AR 600-550).
(32) Final Statements, WD, AGO No. 370 (AR 345-475).
(33) Statement of Clothing charged to Enlisted Men, QMC No. 52.
(34) Receiving Report, QMC No. 57.
(35) Requisition, QMC No. 400.
(36) Requisition for Clothing in Bulk, QMC No. 409.
(37) Shipping Ticket, QMC No. 434.
(38) Memorandum Receipt, QMC No. 487.
(39) Report of Survey, WD, AGO No. 15.
(40) Data for U. S. Registration Number Motor Vehicle, QMC No. 220.
(41) Motor Vehicle Transfer Form, QMC No. 221.
(42) Driver's Report Accident Motor Transportation, Standard Form No. 26.
(43) Investigating Officer's Report Accident Motor Transportation, Standard Form No. 27.
(44) Motor Vehicle Service Record Book, QMC No. 248.
(45) Motor Vehicle Operation and Maintenance Cost Record, QMC No. 222.
(46) United States Army Motor Vehicle Operator's Permit, QMC No. 228.
(47) Books Ordnance Motor, Ordnance No. 005956.
*(48) Annual Physical Inventory Report of Motor Vehicles, QMC No. 252.
*(49) Annual Report of Motor Vehicle Changes of Responsibility, QMC No. 253.
(50) Light Tank Mechanical Inspection Report.
(51) 100-Hour Check List.
(52) Tank Commander's Report.
(53) Battery Inspection Report.
(54) Ordnance Motor Book.

*To be prepared by company only when company is acting alone; is normally prepared by battalion.

12. *COMMUNICATION SERGEANT*

a. Perform the duties of the individual soldier (Par. 16).
b. Assisted by the radio electrician, check all radios and

communication equipment in the company.

c. Report deficiencies to the communication officer and prepare requisitions for replacements needed.

13. *PLATOON SERGEANT*

a. Perform the duties of the individual soldier (Par. 16).

b. Have the platoon prepare for inspection, on the beds and the trunk lockers, all equipment and clothing listed to be taken (Appendix No. 1). Have the packs and barrack bags hung on the foot of the beds. See that each barrack bag is properly tagged with the man's name, rank, organization, company number and serial number.

c. Supervise the issue of the additional equipment (Appendix No. 1).

d. Assist the platoon leader in the full field inspection and the assembly of rolls and barrack bags immediately thereafter.

e. Supervise the performance of all other duties of the men in his platoon (Par. 16).

f. Check in all surplus government clothing and equipment of the members of his platoon. Have these articles assembled in bundles of ten each and turned in to the supply sergeant.

g. Check all bundles of personal property. Those for mailing will be turned in to the orderly room.

h. Assure that the necessary additional equipment listed in Appendix No. 1 is secured by each member of his platoon.

i. Have the platoon squad room thoroughly policed.

j. Report to the first sergeant when *a* and *b* have been completed.

14. *CHIEF MECHANIC*

a. Perform the duties of the individual soldier (Par. 16).

b. Perform the duties of a platoon sergeant for the maintenance section.

c. When *a* and *b* are completed, report that fact to the first sergeant and then report to the maintenance officer prepared to assist in making a mechanical inspection of all tanks and vehicles in the company.

d. Supervise the loading of mechanical equipment onto the maintenance trucks.

e. Have the tool kits of the mechanics prepared for inspection by the maintenance officer.

15. *TANK COMMANDER*

a. Perform the duties of the individual soldier (Par. 16).

b. Supervise the preparation of the equipment of his tank crew for inspection by the platoon leader and its assembly upon completion of the inspection. See that each barrack bag is properly tagged with the man's name, rank, organization, company number and serial number.

c. Assist the platoon sergeant in the checking of the surplus government clothing and equipment.

d. Supervise the policing of his area of the squad room.

e. Upon completion of *a* to *d*, report with his crew to the tank park and prepare his tank and its equipment for movement.

16. *INDIVIDUAL SOLDIER*

a. Display full field equipment for inspection on his bed.

b. Place on the cover of his trunk locker all extra articles of clothing and equipment that are to be carried in his barrack bag.

c. Upon completion of the inspection, assemble his full field equipment and hang it on the foot of his bed. The additional articles will be packed in the barrack bag, tagged with his name, rank, organization, company number and serial number, and the barrack bag will be secured to the foot of his bed.

d. Turn in to his platoon sergeant in the platoon squad room all articles of government clothing and equipment not listed to be taken (Appendix No. 1). (Bedsteads, pillows, mattresses, trunk lockers and wall lockers will be left in position to be checked.)

e. Prepare a bundle of all surplus personal property not to be taken. Wrap and tie it securely, and label it with his name, rank and organization, and the name and address

of his nearest relative. (The bundle will ordinarily be mailed immediately.)

f. Each man who is married and living on the post will make necessary arrangements for moving his family from the post.

APPENDIX NO. 1

to

MOBILIZATION REMINDER

of

COMPANY A, Nth INFANTRY (LIGHT TANKS)

NOTE.—This appendix, prepared by the company commander, should contain the following information:

a. Individual clothing and equipment to be taken.

b. Any organizational property, above authorized allowances, permitted to be taken.

c. In what manner organizational property is to be carried.

d. Individual clothing and equipment NOT to be taken.

APPENDIX NO. 2

to

MOBILIZATION REMINDER

of

COMPANY A, Nth INFANTRY (LIGHT TANKS)

COMPANY COMMANDER'S CHECK LIST

1. Complete list of organization and individual property to be taken, showing how it will be carried. (Appendix No. 1.)
2. Tags on personal property.
3. Tags on barrack bags.
4. Officers' equipment; weight allowances.
5. Articles to be returned to quartermaster, medical, engineer, chemical warfare, ordnance, signal, battalion supply officers.
6. Menus for the required number of days of travel.
7. Requisition to post commissary officer for the necessary rations as directed by higher headquarters.
8. List showing amounts and kinds of ammunition required (ammunition officer or S-4 to deliver ammunition without requisition).
9. Boxes to ship organization equipment marked as prescribed by AR 30-940.
10. Requisition for existing shortages of clothing, equipment, tools, parts and equipment.
11. Telegrams for recall of all enlisted men on furlough.
12. Separate roster of men sick in hospital, prisoners awaiting trial by or result of sentence of General Courts-Martial, who are to be transferred from the regiment.

13. Lists of men to be returned to duty from special duty, detached service, garrison prisoners.
14. Records of men transferred to other organizations.
15. Report of shortage of personnel.
16. Disposition of company fund property.
17. Vouchers for payments received from sale of Post Exchange shares.
18. Check I & I reports of property being turned in for salvage.
19. Shipping tickets for any freight shipped and lists of boxes, crates, to be entered on bills of lading.
20. Notify battalion supply officer of any unserviceable vehicles and tanks and request replacements.
21. Credit memorandum receipt for quartermaster property turned in.
22. Credit memorandum receipt for ordnance property turned in.
23. Credit memorandum receipt for property turned in to battalion supply officer.
24. Receipt for theatre coupon books.
25. Roster of company showing number of men by grade who accompany the organization.
26. Clearance papers for all officers.
27. Check on cadres remaining at post if the company is required to furnish any cadres. Are cadres complete? Do the men know their new organization and their duties therein? Does each man have his complete individual equipment?

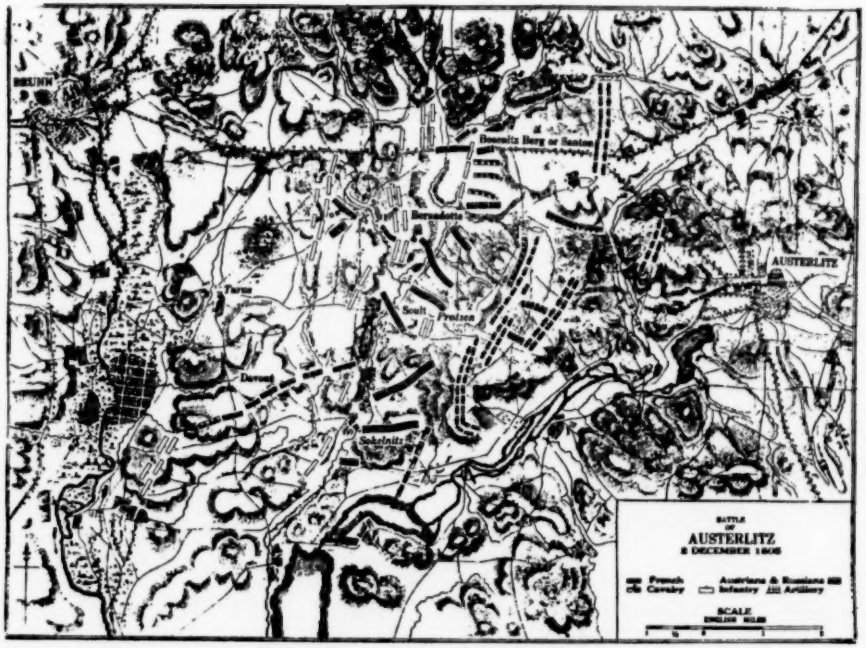

FIGURE 7.—Battle of Austerlitz.
(Reproduced from an old map.)

DRAMATIC PERSONAE

Korsokoff	Napoleon
Dolgoruki	Marshal Davout
Bosloff	Marshal Bernadotte
Barlov	Marshal Berthier
Solkoff	Marshal Soult
Von Bohm	Kutusov
Marsal	Mack
Parlac Heights	Heights of Pratzen
Bornople	Brunn
Glogau	Olmutz